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ARCHAEOLOGICAL INVESTIGATIONS AT SITE 45-DO-214, CHIEF JOSEPH DAM PROJECT, WASHINGTON

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Final report submitted to the U.S. Army Corps of Engineers, Seattle District, in partial fulfillment of the conditions and specifications of Contract No. DACW67-78-C-0106.

The technical findings and conclusions in this report do not necessarily reflect the views or concurrence of the sponsoring agency.

Office of Public Archaeology
Institute for Environmental Studies
University of Washington

1984

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ABSTRACT

Site 45-DO-214 is on the south bank of the Columbia River (River Mile 588) near the Okanogan Highland-Columbia Plateau boundary, in an Upper Sonoran life zone. The University of Washington excavated 192.6 m^3 of site volume in 1979 for the U.S. Army Corps of Engineers, Seattle District as part of a mitigation program associated with adding 10 ft to the operating pool level behind Chief Joseph Dam. Systematic, aligned random sampling with 1 x 1 x 0.1 meter collection units in 1 x 2 or 2 x 2-m cells disclosed three prehistoric components contained in slope derived colluvial deposits and later overbank deposits. Projectile point styles of the earliest component indicate a Hudnut Phase association from 4,000 to 2,000 years ago. The river then cut away much of the terrace resulting in a hiatus in the archaeological record of about 800 years. This hiatus was followed by a series of occupations dating from 1,200 to 1,000 years ago enclosed in rapidly deposited overbank sediments. The final component is relatively dated by projectile point styles to the last 1,000 years. The second and third components represent the Coyote Creek Phase. While there is no change in technological processes or kinds of functional traces through time, there is variation in economic emphasis and intensity of site use. The earliest component is characterized by shellfish processing and hunting. The second component shows an emphasis on hunting and fishing and the greatest intensity of site use. The final component indicates occasional camping with associated hunting activities. Hearths and debris concentrations appear in all of the components, most commonly in the second. The second component is also distinguished by the presence of two unique features, an earth oven and a cached bone working tool kit, containing fishing implements and other bone artifacts in various stages of completion.

TABLE OF CONTENTS

ABSTRACT iii

TABLE OF CONTENTS v

LIST OF FIGURES ix

LIST OF TABLES xiii

LIST OF PLATES xvii

PREFACE xix

ACKNOWLEDGEMENTS xxi

1. INTRODUCTION 1
Christian J. Miss and Leon L. Leeds

INVESTIGATIONS AT 45-DO-214 5
REPORT ORGANIZATION 6

2. STRATIGRAPHY AND CHRONOLOGY 9
Sarah K. Campbell and S. Neal Crozier

GEOLOGIC SETTING 9
PROCEDURES 10
DEPOSITIONAL HISTORY 13
CULTURAL ANALYTIC ZONES 16
ZONE 4 20
ZONE 3 20
ZONE 2 20
ZONE 1 21
SUMMARY 21

3. ARTIFACT ANALYSES 23
Christian J. Miss

TECHNOLOGICAL ANALYSIS 25
FUNCTIONAL ANALYSIS 34
PROJECTILE POINTS 41
PROJECTILE POINT TIPS 46
PROJECTILE POINT BASES 46
BIFACES 46
DRILLS 47
GRAVERS 50

    - SCRAPERS . . . 51
    - SPOKESHAVES . . . 52
    - TABULAR KNIVES . . . 52
    - ADZE . . . 53
    - MAUL . . . 53
    - CHOPPER . . . 53
    - HAMMERSTONES . . . 53
    - ANVIL . . . 53
    - PERIPHERALLY FLAKED COBBLES . . . 58
    - CORE . . . 58
    - UTILIZED FLAKES . . . 58
    - UNIFACIALLY RETOUCHED FLAKES . . . 58
    - BIFACIALLY RETOUCHED FLAKES . . . 62
    - RESHARPENING FLAKES . . . 63
    - LINEAR FLAKE . . . 64
  - **GROUND STONE AND SHELL ARTIFACTS** . . . 64
    - PIPES . . . 64
    - BEADS . . . 64
    - ABRADERS . . . 65
  - **STYLISTIC ANALYSIS** . . . 65
  - **BONE ARTIFACTS** . . . 77

4. **FAUNAL ANALYSIS** . . . 87
   Stephanie Livingston and R. Lee Lyman
  - **FAUNAL ASSEMBLAGE** . . . 87
  - **SPECIES LIST** . . . 87
  - **DISCUSSION** . . . 93
    - BUTCHERING . . . 93
    - SEASONALITY . . . 94
  - **SUMMARY** . . . 94

5. **BOTANICAL ANALYSIS** . . . 97
   Nancy A. Stenholm
  - **THE BOTANICAL ASSEMBLAGE** . . . 97
    - TESTING MATERIALS . . . 97
      - **Data Recovery Material** . . . 100
  - SUMMARY BY ZONE . . . 114
    - ZONE 4 . . . 114
    - ZONE 3 . . . 115
      - **Unit Level Material from Testing Unit** . . . 115
      - **Feature Materials** . . . 115
      - **Data Recovery Material** . . . 116
      - **Feature 5** . . . 116
      - **Unit Level Materials** . . . 118
    - ZONE 2 . . . 118
    - ZONE 1 . . . 119

6. **FEATURES ANALYSIS** . . . 121
   Dorothy Sammons-Lohse
  - **ZONE 4** . . . 121
  - **ZONE 3** . . . 126

ZONE 2 133
ZONE 1 138
FEATURE 11 140
SUMMARY 140

7. SYNTHESIS 143
Christian J. Miss

GEOCHRONOLOGY 143
CULTURAL CHRONOLOGY 144
SEASONALITY 144
FAUNAL REMAINS 146
BOTANICAL REMAINS 148
ARTIFACT DISTRIBUTION 150
ZONE 4 (4000-2000 B.P.) 151
ZONE 3 (1200-1000 B.P.) 153
ZONE 2 (1200-1000 B.P.) 156
ZONE 1 (1000 B.P.-Protohistoric) 156
SUMMARY AND CONCLUSIONS 159

REFERENCES 161

APPENDIX A: Radiocarbon Date Samples 171

APPENDIX B: Artifact Assemblage 173

APPENDIX C: Faunal Assemblage 197

APPENDIX D: Feature 5 Botanical Assemblage 203

APPENDIX E: Artifact Distributions 210

APPENDIX F: Description of Contents of Uncirculated Appendices 227

LIST OF FIGURES

Figure 1-1. Project area map 2

Figure 1-2. Site vicinity map 3

Figure 1-3. Stratified random sampling design 7

Figure 1-4. Units excavated 8

Figure 2-1. Geologic map of 45-DO-214 vicinity 11

Figure 2-2. Location of stratigraphic profiles, column samples, and transect 12

Figure 2-3. Representative stratigraphic profile from block excavation 14

Figure 2-4. Schematic stratigraphic cross section 17

Figure 2-5. Schematic cross section of 45-DO-214 showing vertical and horizontal location of zones 19

Figure 3-1. Schematic of the bifacial reduction process 28

Figure 3-2. Schematic of the cobble reduction process 29

Figure 3-3. Kind of debitage by material type 31

Figure 3-4. Size attributes of conchoidal flakes 31

Figure 3-5. Relative frequency of <1/4 in flakes by zone 31

Figure 3-6. Proportion of primary flakes by zone 31

Figure 3-7. Utilization/modification by zone 37

Figure 3-8. Manufacture disposition by zone 37

Figure 3-9. Wear/manufacture relationship by zone 37

Figure 3-10. Kinds of wear by zone 39

Figure 3-11. Locations of kinds of wear 39

Figure 3-12. Shapes of worn areas associated with kinds of wear 39

Figure 3-13. Edge angles associated with kinds of wear 40

Figure 3-14. Nephrite adzes 56

Figure 3-15. Quartzite maul 57

Figure 3-16. Pipes and abraders 66

Figure 3-17. Morphological types of projectile points 68

Figure 3-18. Temporal distribution of morphological projectile point types in the project area 72

Figure 3-19. Cultural zones in relation to Rufus Woods Lake cultural phases and cultural sequences of nearby study areas . . . 76

Figure 3-20. Composite harpoon 78

Figure 3-21. Bone artifacts 80

Figure 3-22. Large mammal rib awl 82

Figure 3-23. Antler tine handle 83

Figure 3-24. Antler wedge 84

Figure 3-25. Antler wedge 85

Figure 5-1. Carbon to soil ratio and carbon purity, by analytic zone, radiocarbon year, and unit level, testing unit 50N27E 98

Figure 5-2. Archaeological birch bark detail 104

Figure 5-3. Reconstructed bark wrapped pine tool from two samples . . 107

Figure 5-4. Douglas fir artifact with bark wrappings, M#1495 108

Figure 5-5. Douglas fir artifact with bark wrappings, M#1504 108

Figure 6-1. Location of features, Zone 4 123

Figure 6-2. Shell scatter (Feature 15), Zone 4 125

Figure 6-3. Plan maps of shell scatter in Zone 4 (Feature 19) 126

Figure 6-4. Location of features, Zone 3 127

Figure 6-5. Testing Features A and B 130

Figure 6-6. Plan maps of remnant hearth (Feature 8) and associated activity area (Feature 13), Zone 3 131

Figure 6-7. Plan maps of bone and rock concentrations in Zone 3 (Feature 14) 132

Figure 6-8. Plan map of features from Zones 2 and 3 exposed in block excavation 133

Figure 6-9. Location of features, Zone 2 135

Figure 6-10. Firepits in Zone 2 (Features 7 and 9) and Zone 1 (Feature 10) 136

Figure 6-11. Plan map of bone and rock concentration in Zone 2 (Feature 16) 137

Figure 6-12. Locations of Features, Zone 1 139

Figure 6-13. Plan map of bone scatter in Zone 1 (Feature 20) 140

Figure 6-14. Frequency of feature types by zone 141

Figure 7-1. Distribution of seasonal indicators by zone 145

Figure 7-2. Distribution of cultural materials, Zone 4 152

Figure 7-3. Distribution of cultural materials, Zone 3 154

Figure 7-4. Distribution of selected artifacts, Zone 3 155

Figure 7-5. Distribution of cultural materials, Zone 2 157

Figure 7-6. Distribution of cultural materials, Zone 1 158

Figure B-1. Breakage terminology illustrated 182

Figure B-2. Location of projectile point assemblages analyzed 186

Figure B-3. Location of digitized landmarks and measurement variables on projectile points 187

Figure B-4. Historical projectile point type classification 188

Figure B-5. Projectile point outlines derived from digitized measurements 189

Figure E-1. Bone count distribution for Zone 4 211

Figure E-2. Lithic count distribution for Zone 4 212

Figure E-3. FMR count distribution for Zone 4 213

Figure E-4. Shell count distribution for Zone 4 214

Figure E-5. Bone count distribution for Zone 3 215
Figure E-6. Lithic count distribution for Zone 3 216
Figure E-7. FMR count distribution for Zone 3 217
Figure E-8. Shell count distribution for Zone 3 218
Figure E-9. Bone count distribution for Zone 2 219
Figure E-10. Lithic count distribution for Zone 2 220
Figure E-11. FMR count distribution for Zone 2 221
Figure E-12. Shell count distribution for Zone 2 222
Figure E-13. Bone count distribution for Zone 1 223
Figure E-14. Lithic count distribution for Zone 1 224
Figure E-15. FMR count distribution for Zone 1 225
Figure E-16. Shell count distribution for Zone 1 226

LIST OF TABLES

Table 2-1. Profile descriptions, block excavation only 15

Table 2-2. The analytic zones: stratigraphic definition, radiocarbon dates, and contents 18

Table 3-1. Formal object types sorted by zone 24

Table 3-2. Frequency of lithic material type by zone 26

Table 3-3. Ratios of relative frequencies of lithic materials by zone 26

Table 3-4. Cryptocrystalline artifact types by zone 30

Table 3-5. Quartzite and basalt artifacts by zone 33

Table 3-6. Zone frequencies of artifacts of other lithic material sorted by formal category 34

Table 3-7. Variables of wear and implied functions 35

Table 3-8. Number of objects, number of locations of wear, ratio number of locations, number of objects 42

Table 3-9. Edge angles for formed objects in relation to the kinds and locations of wear 43

Table 3-10. Wear complexes; projectile points, bases, tips 44

Table 3-11. Projectile point breakage location and kind by zone 45

Table 3-12. Wear complexes; bifaces 47

Table 3-13. Wear complexes; drills 50

Table 3-14. Wear complexes; gravers 50

Table 3-15. Wear complexes; scrapers 51

Table 3-16. Wear complexes; tabular knives 52

Table 3-17. Wear complexes; utilized flakes 57

Table 3-18. Wear complexes; unifacially retouched flakes 62

Table 3-19. Wear complexes; bifacially retouched flakes 63

Table 3-20. Wear complexes; resharpening flakes 64

Table 3-21. Morphological projectile point types by analytic zone . . . 69

Table 3-22. Morphological types by historical types 74

Table 3-23. Historical types sorted by analytic zone 75

Table 3-24. Frequencies and description of shaped and partially modified bone artifacts 81

Table 4-1. Taxonomic composition and distribution of vertebrate remains 88

Table 5-1. Flotation assemblage from testing unit 50N27E 99

Table 5-2. Botanical assemblage of Zone 3 by unit level, Feature A flots, and radiocarbon samples 101

Table 5-3. Botanical assemblage of Feature 5 117

Table 6-1. Features by type, dimensions, depth, and contents by counts and weights 122

Table 6-2. Contents of Feature 5 129

Table 7-1. Distribution of economic fauna among analytic zones 147

Table 7-2. Flora identified 149

Table A-1. Radiocarbon date samples 172

Table B-1. Technological dimensions 173

Table B-2. Size attributes of CCS conchoidal flakes by zone 174

Table B-3. Size attributes of quartzite conchoidal flakes by zone . . 174

Table B-4. Size attributes of basalt conchoidal flakes by zone . . . 175

Table B-5. Kinds of debitage by material type by zone 175

Table B-6. Primary and secondary cryptocrystalline, quartzite and basalt debitage by zone 176

Table B-7. Less than 1/4 inch flakes by material type and zone 177

Table B-8. Count of condition by zone 177

Table B-9. Functional dimensions 178

Table B-10. Type of manufacture by zone 179

Table B-11. Orientation of wear by zone 179

Table B-12. Kind of wear, location of wear, and shape of worn area by zone 180

Table B-13. Breakage location and kind by historical type 183

Table B-14. Dimensions of morphological projectile point classification. 184

Table B-15. Complete morphological classification of projectile points 185

Table B-16. Descriptive statistics for projectile points 192

Table B-17. Description of individual bone artifacts by class 194

LIST OF PLATES

Plate 1-1. View to the south 4

Plate 1-2. View to the east 4

Plate 3-1. Examples of gravers, scrapers, drills, cores and bifaces . 48

Plate 3-2. Examples of cobble tools 54

Plate 3-3. Examples of flakes and beads 60

Plate 3-4. Examples of projectile points 70

Plate 5-1. Bark haft found with charred mock orange artifact 106

Plate 5-2. Reconstructed haft 106

Plate 5-3. Chokecherry pit with charred flesh 112

Plate 6-1. Artifact cache, Feature 5 128

Plate 6-2. Petroglyph, Feature 11 128

PREFACE

The Chief Joseph Dam Cultural Resources Project (CJDCRP) has been sponsored by the Seattle District, U.S. Army Corps of Engineers (the Corps) in order to salvage and preserve the cultural resources imperiled by a 10 foot pool raise resulting from modifications to Chief Joseph Dam.

From Fall 1977 to Summer 1978, under contract to the Corps, the University of Washington, Office of Public Archaeology (OPA) undertook detailed reconnaissance and testing along the banks of Rufus Woods Lake in the Chief Joseph Dam project area (Contract No. DACW67-77-C-0099). The project area extends from Chief Joseph Dam at Columbia River Mile (RM) 545 upstream to RM 590, about seven miles below Grand Coulee Dam, and includes 2,015 hectares (4,979 acres) of land within the guide-taking lines for the expected pool raise. Twenty-nine cultural resource sites were identified during reconnaissance, bringing the total number of recorded prehistoric sites in the area to 279. Test excavations at 79 of these provided information about prehistoric cultural variability in this region upon which to base further resource management recommendations (Jermann et al. 1978; Leeds et al. 1981).

Only a short time was available for testing and mitigation before the planned pool raise. Therefore, in mid-December 1977, the Corps asked OPA to review the 27 sites tested to date and identify those worthy of immediate investigation. A priority list of six sites, including 45-DO-214, was compiled. The Corps, in consultation with the Washington State Historic Preservation Officer and the Advisory Council on Historic Preservation, established an Interim Memorandum of Agreement under which full-scale excavations at those six sites could proceed. In August 1978, data recovery (Contract No. DACW67-78-C-0106) began at five of the six sites.

Concurrently, data from the 1977 and 1978 testing, as well as those from previous testing efforts (Osborne et al. 1952; Lyman 1976), were synthesized into a management plan recommending ways to minimize loss of significant resources. This document calls for excavations at 34 prehistoric habitation sites, including the six already selected (Jermann et al. 1978). The final Memorandum of Agreement includes 20 of these. Data recovery began in May 1979 and continued until late August 1980.

Full-scale excavation could be undertaken at only a limited number of sites. The testing program data allowed identification of sites in good condition that were directly threatened with inundation or severe erosion by the projected pool raise. To aid in selecting a representative sample of prehistoric habitation sites for excavation, site "components" defined during testing were characterized according to (1) probable age, (2) probable type of occupation, (3) general site topography, and (4) geographic location along the river (Jermann et al. 1978:Table 18). Sites were selected to attain as wide a diversity as possible while keeping the total number of sites as low as possible.

The Project's investigations are documented in four report series. Reports describing archaeological reconnaissance and testing include (1) a management plan for cultural resources in the project area (Jermann et al. 1978), (2) a report of testing at 79 prehistoric habitation sites (Leeds et al. 1981), and (3) an inventory of data derived from testing. Series I of the mitigation reports includes (1) the project's research design (Campbell 1984d) and (2) a preliminary report (Jaehnig 1983b). Series II consists of 14 descriptive reports on prehistoric habitation sites excavated as part of the project (Campbell 1984b; Jaehnig 1983a, 1984a,b; Lohse 1984a-f; Miss 1984a-d), reports on prehistoric nonhabitation sites (Campbell 1984a) and burial relocation projects (Campbell 1984c), and a report on the survey and excavation of historic sites (Thomas et al. 1984). A summary of results is presented in Jaehnig and Campbell (1984).

This report is one of the Series II mitigation reports. Mitigation reports document the assumptions and contingencies under which data were collected, describe data collection and analysis, and organize and summarize data in a form useful to the widest possible archaeological audience.

ACKNOWLEDGEMENTS

This report is the result of the collaboration of many individuals and agencies. During the excavation and early reporting stages, Coprincipal Investigators were Drs. Robert C. Dunnell and Donald K. Grayson, both of the Department of Anthropology, University of Washington, and Dr. Jerry V. Jermann, Director of the Office of Public Archaeology, University of Washington. Dr. Manfred E.W. Jaehnig served as Project Supervisor during this stage of the work. Since Fall of 1981 Dr. Jaehnig has served as co-Principal Investigator with Dr. Dunnell.

Several members of the Corps of Engineers staff have made major contributions to the project. They are Dr. Steven F. Dice, Contracting Officer's Representative, and Corps archaeologists Lawr V. Salo and David A. Munsell. Both Mr. Munsell and Mr. Salo have worked to assure the success of the project, from its initial organization through site selection, sampling, analysis, and report writing. Mr. Munsell provided much needed guidance in the initial stages of the project and developed the strong ties with the Colville Confederated Tribes essential for the undertaking. Mr. Salo gave generously of his time to guide the project through data collection and analysis. In his review of each report, he exercises that rarest of skills, an ability to criticize constructively.

We have been fortunate in having the generous support and cooperation of the Colville Confederated Tribes throughout the entire length of the project. The Tribes' governing body, the Business Council, and the History and Archaeology Office have been invaluable. We owe special thanks to Andy Joseph, representative from the Nespelem District on the Business Council, and Adeline Fredin, Tribal Historian and Director of the History and Archaeology Office. Mr. Joseph and the Business Council, and Mrs. Fredin, who acted as liaison between the Tribe and the project, did much to convince appropriate Federal and State agencies of the necessity of the investigation. They helped to secure the land and services needed for the project's field facilities as well as to establish a program which trained local people, including many tribal members, to be field excavators and laboratory technicians. Beyond all this, they extended us courtesy and kindness which has made our stay in the project area a pleasant one. In return, conscious of how much gratitude must be packed into a few brief words, we extend our sincere thanks to all the members of the Colville Confederated Tribes who have supported our efforts, and to Mrs. Fredin and Mr. Joseph in particular.

Site 45-DO-214 is located on land owned by Hydra, Inc. We thank Hydra, Inc. and Mr. Harold Tesch, who manages the land for the corporation, for granting us permission to excavate the site.

As authors of this report, we take responsibility for the contents. What we have written, however, is only the final stage of a collaborative process which perhaps has its nearest, and most appropriate, analogue in the integrated community of the people whose physical traces we have studied here. Some, by dint of hard labor and archaeological training, salvaged those traces from the earth; others processed and analyzed those traces; some manipulated the data and some wrote, or edited and produced this report. Each is a member of the community essential to the life of the work we have done.

Jerry V. Jermann, Co-principal Investigator during the field excavation and artifact analysis phase of the project, developed site excavation sampling designs that were used to select data from each site. The designs provided a uniform context for studying prehistoric subsistence-settlement patterns in the project area. The excavation at 45-DO-214 was directed by Jerry Lyons.

S. Neal Crozier did the initial data summary for the stratigraphic analysis; Susan Key and S. Neal Crozier performed the chemical and mechanical sort analyses. Dorothy Sammons-Lohse compiled the data for feature analysis and zone definitions. The laboratory staff under the direction of Karen Whittlesey did the technological and functional artifact analysis. Janice Jaehnig did keypunching and John Chapman and Duncan Mitchell manipulated the computerized data.

The writing of the report itself is a cooperative effort. Dr. Leon L. Leeds initiated the writing process. Christian J. Miss wrote Chapters 1, 3, and 7. As senior author, she also coordinated and integrated the contributions of the other authors. Sarah K. Campbell wrote Chapter 2; Stephanie Livingston and R. Lee Lyman analyzed the faunal assemblage and wrote Chapter 4; Dr. Nancy A. Stenholm analyzed the botanical assemblage, and wrote Chapter 5; Dorothy Sammons-Lohse wrote Chapter 6.

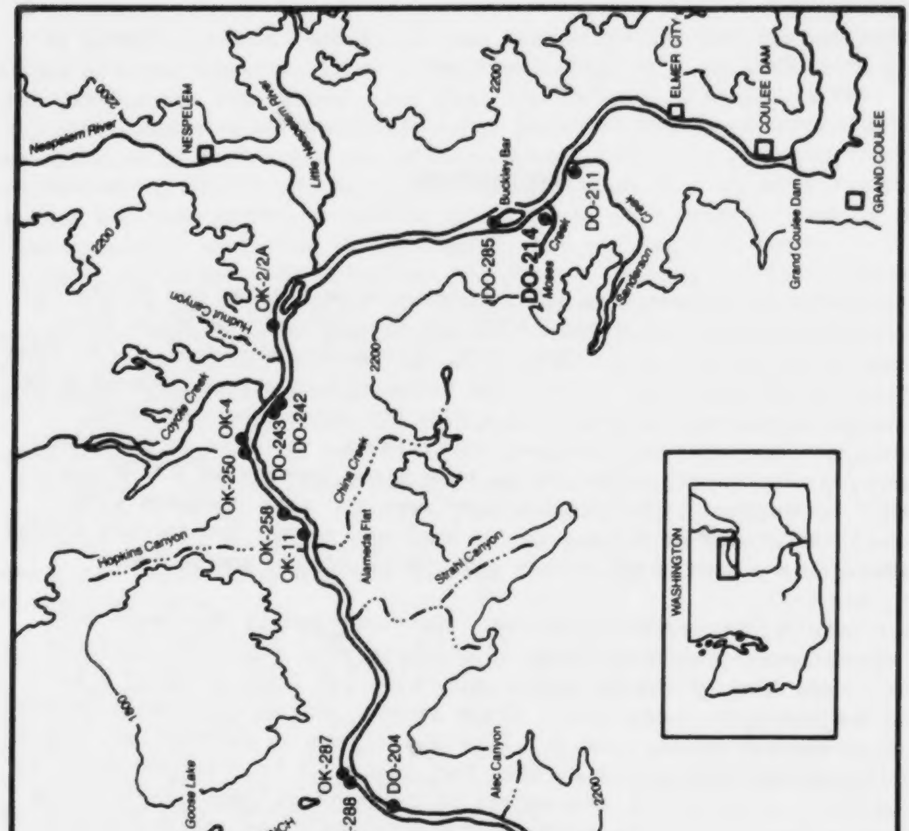
Marc Hudson edited the text; Dawn Brislawn typed the text and coordinated production. Melodie Tune and Bob Radek drafted final graphics and Larry Bullis photographed the artifacts. Artifact drawings were done by Marilyn Morrison except Figure 5-2 and 5-3, drawn by Nancy Stenholm. The camera ready copy was produced by Natalie Cadoret and Karen Weed under the direction of Sarah K. Campbell.

1. INTRODUCTION

Site 45-DO-214 is a small site just upstream from Buckley Bar on the left bank of the Columbia River about 100 m (328 ft) downstream from River Mile 588 in the NW1/4 NE1/4 Section 9, T29N, R30E, Willamette Meridian; U.T.M. Zone 11, N.5,323,481, E.350,244 (Figure 1-1). On a low river terrace covered with small active and semiactive dunes at 293 m (961 ft) above mean sea level (m.s.l.) and about 7 m above the original river level, the site is delimited on the west by a steep rocky slope rising to a broad terrace at 480 m m.s.l. (Figure 1-2). To the north, the terrace continues for some distance with little perceptible change in slope. To the east and south, the terrace slopes steeply downward to a sand beach strewn with large cobbles and boulders (Plates 1-1 and 1-2).

The surrounding topography is varied. Just upstream is the small but perennial Moses Creek. Sanderson Creek is slightly more than 2 km upstream on the Douglas County side of the Columbia, and Peter Dan Creek is about 6 km upstream on the Okanogan County side. These stream canyons host dense growths of broadleaf trees and shrubs. About 0.7 km downstream is Buckley Bar, now an island. At the downstream end of Buckley Bar, about 2.3 km from the site, is Monaghan Rapids, now covered by the waters of Rufus Woods Lake. Equilibrium Rapids, Nespelem Rapids, and the mouth of the Nespelem River are all within 10 km downstream of the site. To the west of the site, above the 480 m terrace, the land rises less precipitously to the top of the escarpment (ca. 790 m m.s.l.), about 2.5 km from the site. On the plateau, within about 10 km, are a number of small pothole lakes, the largest of which are Smith Lake, Rock Lake, and Black Lake. Across the Columbia River from the site, the land rises much more gently to a similar height, and then more steeply to the ridges and peaks ot the Okanogan Highlands. Rebecca Lake, Buffalo Lake, McGinnis Lake, and several smaller lakes, all fed by the Buffalo Lake aquifer, lie within 10 km of the site. The nearest edges of the coniferous forest of the highlands border the eastern ends of Buffalo and McGinnis Lakes.

The Columbia Plateau has a semiarid climate characterized by hot summers and moderately cold winters (Daubenmire 1970:6). In summer, clear skies prevail; temperatures are warm during the day and cool at night. In winter and early spring, storm fronts from the North Pacific bring overcast skies. The marine air masses, however, lose most of their moisture in crossing the Cascades and coastal mountain ranges so that overall precipitation in the project area is slight. Winter temperatures are cold, but moderated by marine air flows.


OKANOGAN HIGHLANDS
OMAK PLATEAU
OMAK TRENCH
COLUMBIA RIVER
(Rufus Woods Lake)
Chief Joseph Dam
Dutley Lake
Turtwater Creek
Turtwater Basin
Stubblefield Point
Goose Lake
Alec Canyon
Strahl Canyon
Alameda Flat
China Creek
Hopkins Canyon
Coyote Creek
Hudnut Canyon
Little Nespelem River
Nespelem River
NESPELEM
Buckley Bar
Moses Creek
Sanderson Creek
Grand Coulee Dam
ELMER CITY
COULEE DAM
GRAND COULEE
WASHINGTON
2200
1800
DO-282
DO-326
OK-18
DO-273
OK-288
OK-287
DO-204
OK-11
OK-258
OK-250
OK-4
DO-243
DO-242
OK-2/2A
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Miles
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Figure 1-1. Project area map, 45-DO-214.

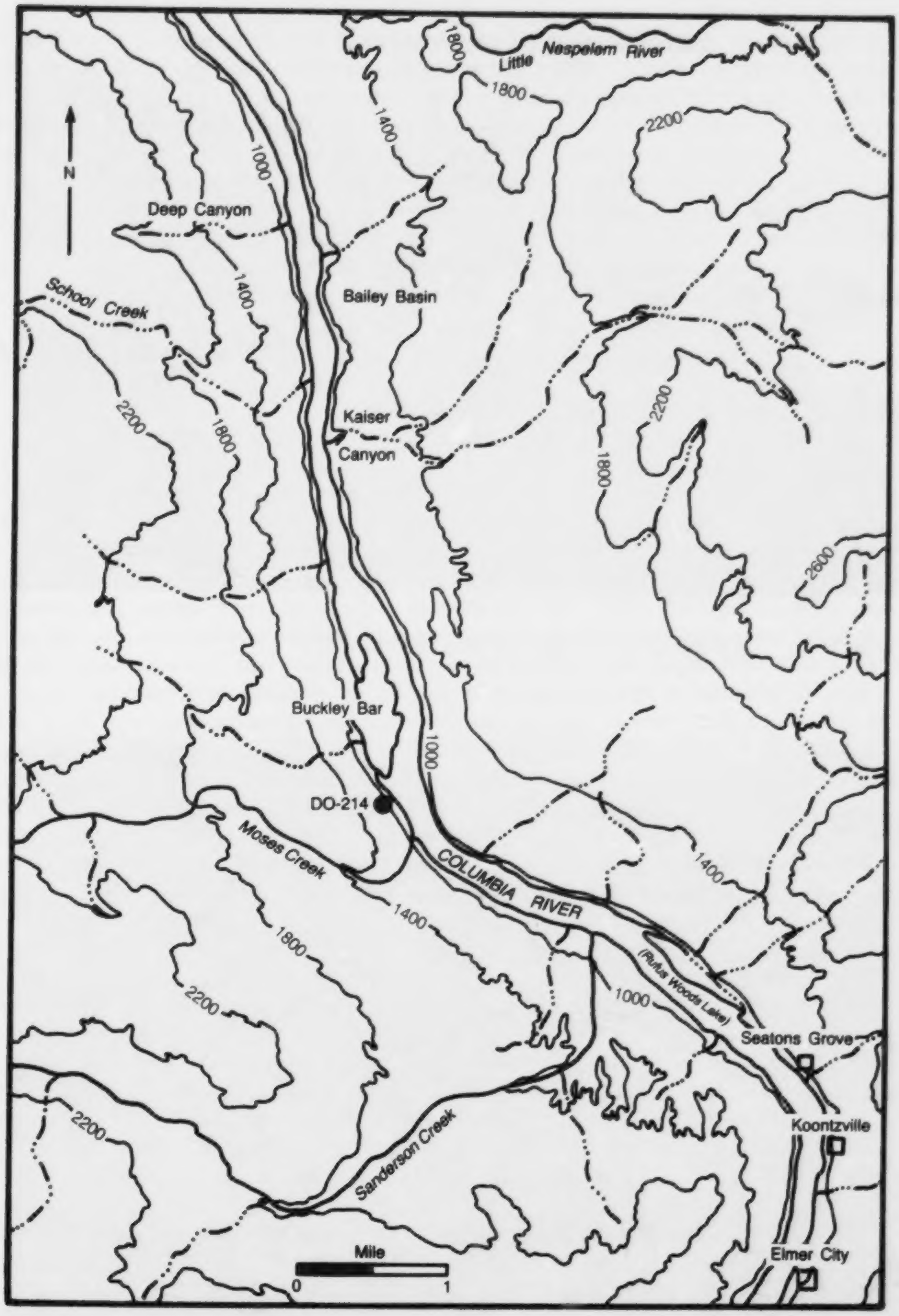

1800
Little Nespelem River
1800
1400
2200
N
1000
Deep Canyon
Bailey Basin
School Creek
1400
2200
1800
Kaiser
Canyon
2200
1800
2600
Buckley Bar
1000
DO-214
Moses Creek
COLUMBIA RIVER
1400
1400
1800
2200
1000
(Rufus Woods Lake)
Seatons Grove
Sanderson Creek
2200
Koontzville
Mile
0
1
Elmer City

Figure 1-2. Site vicinity map, 45-DO-214.

Plate 1-2. 45-DO-214: View to the east.

Plate 1-1. 45-DO-214: View to the south (upriver).

The site lies within the Artemesia-tridentata-Agropyron vegetation association of the river's course (Daubenmire 1970). This vegetation zone is characterized by sagebrush and bunch grass communities with brushy thickets along stream courses. Vegetation on the site is relatively sparse consisting of scattered bitterbrush (Purshia tridentata), sagebrush (Artemesia sp.) and an occasional prickly pear cactus. Cheatgrass (Bromus tectorum) has replaced most of the native grasses and cattle are still grazed on the terrace. Great Mullein (Verbascum thapsus), another intrusive species, also appears in the vicinity. Small stands of ponderosa pine (Pinus ponderosa) can be seen to the north and south of the site.

INVESTIGATIONS AT 45-DO-214

Site 45-DO-214 was first recorded in 1976 (Munsell and Salo, 1977). It was tested by the University of Washington , Office of Public Archaeology in 1977, and subsequently was one of six high priority sites originally recommended for excavation starting in 1978. Testing revealed at least two cultural components. The upper component yielded a radiocarbon date of 1151±168 B.P. (TX-2898, Appendix A, Table A-1). No other dates were obtained during testing; however on the basis of projectile point styles, the lower component was dated tentatively to the period ca. 3500-2500 B.P. Thus the site promised to yield artifact assemblages from occupations separated by as much as 2,000 years. The radiocarbon dated occupation suggested the site held potential information about a period of time associated elsewhere in the region with a river-oriented culture following the pattern described in the ethnographic literature. The tentative dating of the earlier component suggested the site was occupied during a period which approximated a phase boundary in each of the chronological schemes proposed from analysis of excavations at the Wells Reservoir (Grabert 1968), Kettle Falls (Chance and Chance 1977, 1979), and Sunset Creek (Nelson 1969). Data from 45-DO-214 in conjunction with other project excavations were expected to provide valuable new information for comparison with the other chronologies, clarifying a period of regional cultural transition. Cultural materials at the site appeared to be quite dense and there were no apparent housepit depressions. Since several of the other sites recommended for excavation at this time showed evidence of possible housepits, 45-DO-214 was chosen to provide information about other aspects of prehistoric settlement and subsistence patterns in the project area. Finally, the site was selected as one of three clustered farthest upstream in the project area.

For the 1978 excavations a two stage sampling design was developed. During the first stage, a probabilistic sample of units was selected. This approach provides unbiased data for characterizing site contents. During the second stage, a purposive sample was selected to provide additional information about site structure in a specific area.

Probabilistic sampling at 45-DO-214 was done within a stratified random sampling design. Sampling strata were developed by superimposing a 2-m square grid of 240 units on the site area. Each unit was numbered serially from 1 through 240, starting at the northwest corner with unit 78N22E and proceeding from west to east and from north to south. The 240 units were then divided into five sets (sampling strata) of 48 primary sampling units each. Six sample units were chosen for each stratum by selecting numbers between 1 and 240 from a random number table and using the first six numbers that corresponded to units in each stratum. The order of selection corresponded to the sequence in which the units in each stratum were excavated. The stratified random sampling design for the site is shown in Figure 1-3.

The first three sample units were excavated in four of the five sampling strata, resulting in a 6% sample of the total site area. The sampling design was slightly modified in Stratum 2. Since the first-order unit extended more than halfway out over the steep bank, the second, third, and fourth units were dug instead. In addition, the fifth-order sample unit (62N20E) was excavated to provide better spacing in this area.

Excavation of units 50N26E and 48N24E yielded evidence of three stratified, darkly stained layers containing concentrations of artifacts. These appeared to be former stabilized terrace surfaces. To explore this area more extensively 11 purposive 2 x 2-m squares were excavated (Figure 1-4). Another purposive unit (64N6E) was excavated to clarify the nature of cultural deposits near the northwestern site margin. Random and non-random units included 114 m^2 or 11.8% of the approximately 968 m^2 area of the site.

Full-scale excavations at 45-DO-214 lasted nearly four months from August 1 to November 21, 1978. The field crew, consisting of a supervisor and four to seven excavators, excavated 192.6 m^3 of matrix from 126 1 x 1-m units. Field excavation methods used at the site are described in the project's plan of action (Jermann and Whittlesey 1978) and research design (Campbell 1984c).

REPORT ORGANIZATION

An assemblage of 1,901 fire-modified rocks, 16,547 lithic artifacts, 55,016 bone fragments, and 7,773 pieces of shell was recovered. Carbon samples and samples for matrix and botanical analysis were collected. The subsequent chapters present the results of the analysis of this material. Chapter 2 discusses the site's natural and cultural stratigraphy. Chapters 3, 4, 5, and 6 present the results of the artifact, faunal, botanical, and cultural feature analyses. The final chapter provides a synthesis of the data, discussing site chronology and function.

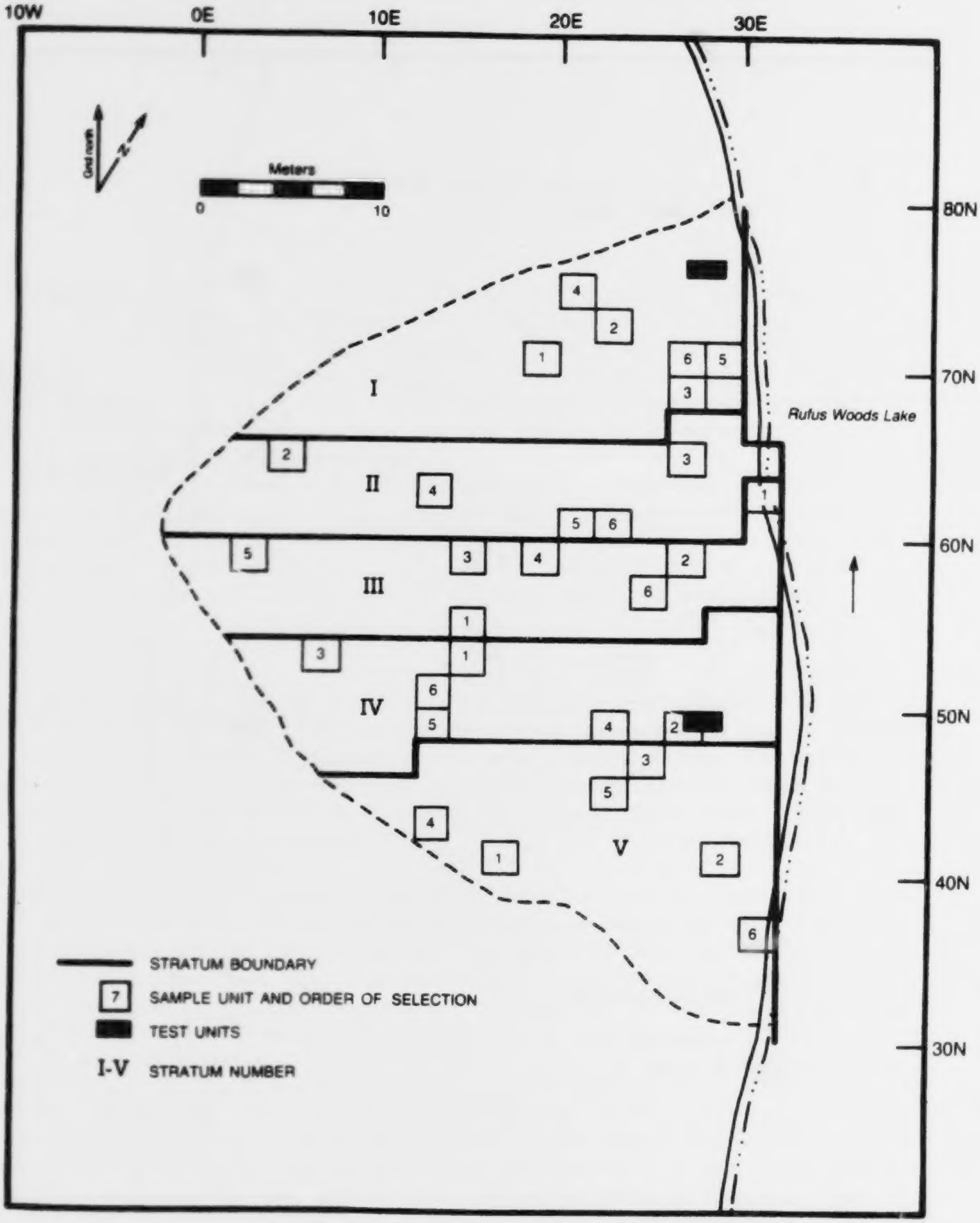

10W
0E
10E
20E
30E
Grid north
Z
Meters
0
10
80N
70N
60N
50N
40N
30N
Rufus Woods Lake
I
II
III
IV
V
STRATUM BOUNDARY
7 SAMPLE UNIT AND ORDER OF SELECTION
TEST UNITS
I-V STRATUM NUMBER

Figure 1-3. Stratified random sampling design, 45-DO-214.

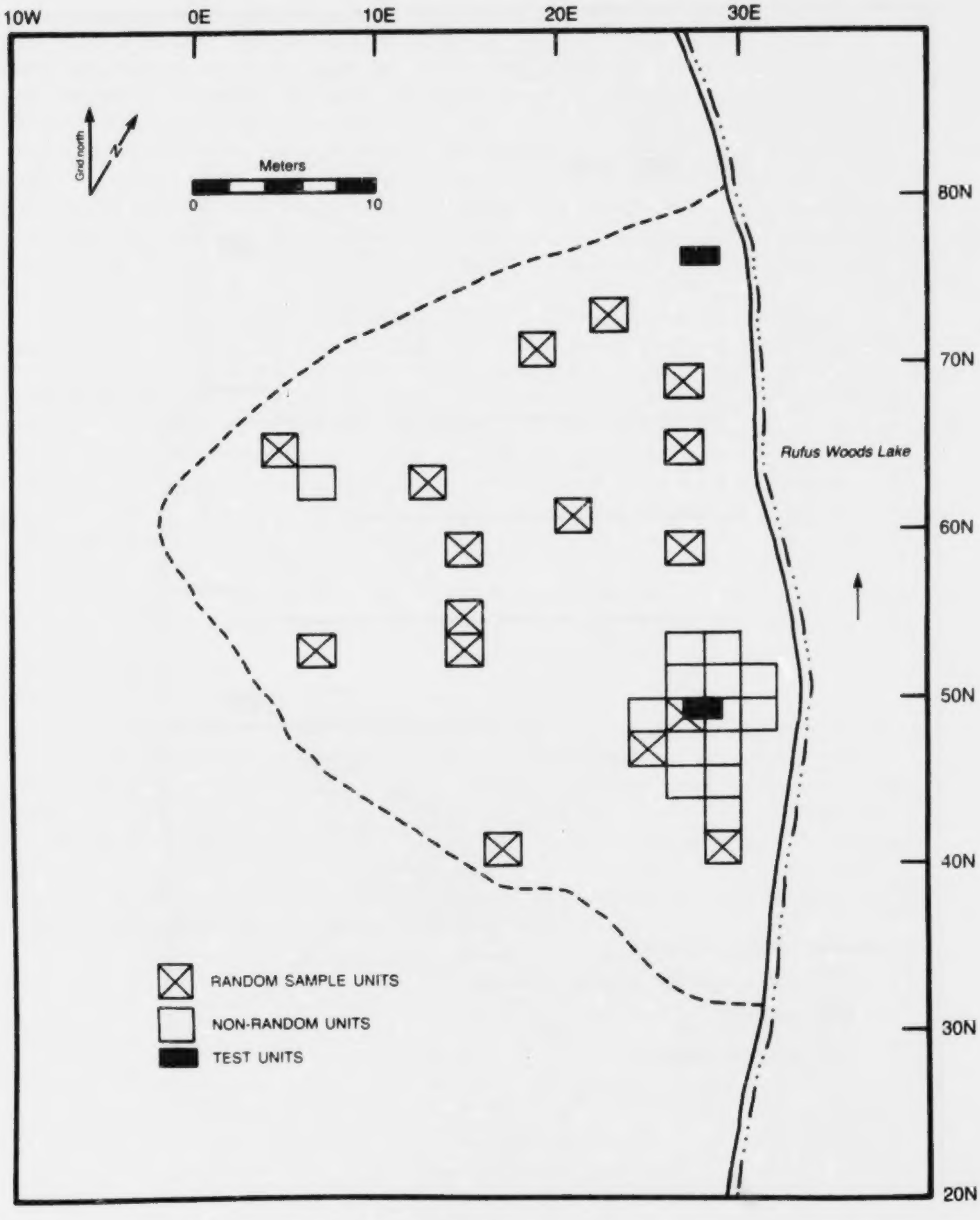

10W
0E
10E
20E
30E
Grid north
N
Meters
0
10
80N
70N
60N
50N
40N
30N
20N
Rufus Woods Lake
RANDOM SAMPLE UNITS
NON-RANDOM UNITS
TEST UNITS

Figure 1-4. Units excavated, 45-DO-214.

2. STRATIGRAPHY AND CHRONOLOGY

Interpretation of the prehistoric record of the project area requires that one understand the depositional history of each site in the context of the depositional history of the entire area. To do this, each site must be divided into units which can be compared to those at other project sites and be used to delimit episodes of cultural deposition. Stratigraphy provides temporal control within each site as well as a means of correlating cultural deposits with regional geomorphology.

This chapter discusses the geologic setting of site 45-DO-214 with reference to local geologic history and describes the sedimentary history of the site itself in detail. Strata mapped during excavation are grouped into site-wide depositional units, which provide the basis for determining how deposition occurred and for correlating cultural materials among units.

GEOLOGIC SETTING

A detailed discussion of the geologic history of the project area will be dealt with in the project's Synthesis Report. Here we have made use of several references to reconstruct a summary of the area's geochronology during the Holocene: a geomorphological study of the project area (Hibbert 1980), a geomorphological study of the neighboring Wells Reservoir (Fryxell 1973), and pollen studies in the project area (Dalan 1978, 1979, Nickman and Leopold 1981).

Site 45-DO-214 is located in the upper canyon of the project area. Here, the Columbia River flows along the eastern margin of the Waterville Plateau where the Columbia River Basalts contact the granitic rocks of the Colville Batholith. It is believed the river has flowed along the margin of the Plateau since the late Miocene outpouring of basalts. During the Pleistocene, the middle and northern reaches of the Columbia River drainage were overlain by ice sheets. The Okanogan Lobe of the Cordilleran ice sheet entirely filled the upper canyon to the Grand Coulee, reaching its maximum extent between 13,000 and 14,500 B.P. The ice wasted away earlier in the upper canyon than in the lower canyon. As a consequence, river waters ponded behind the ice dam, and the upper canyon was filled with a thick profile of glaciolacustrine sediments. When the ice dam in the lower canyon was finally breached, the Columbia River rapidly downcut through the lacustrine sediments with occasional stillstands, creating a deep, narrow valley with a prominent terrace system. Mazama tephra Layer O has been observed in alluvial fans built on to the 1000 ft terrace, indicating that the river reached this elevation before 7000 B.P., and probably reached historic elevations shortly thereafter.

The rapid postglacial downcutting of the Columbia River left a deep canyon characterized by a well-developed terrace system and narrow channel, occurring entirely in bedrock. Depositional and erosional processes responsible for altering the landscape since this time include lateral migration, point bar, and overbank deposition of the Columbia River, alluvial fan development, colluvial deposition, and aeolian deposition. Little floodplain development has taken place in this narrow valley, but natural levees and abandoned channels can be recognized in some areas. Surfaces less than 20 m above the historic river levels commonly exhibit overbank deposits. While this stretch of the river is characterized by comparatively little meandering, local lateral migrations are recorded by the shape of the river, point bar formation, and erosional episodes in site profiles. Alluvial fans have been built on the terraces at the mouths of tributary canyons. Few permanent drainages occur in the project area: most drainage is intermittent and unintegrated. Talus slopes are common at the base of both granitic and basaltic bedrock formations. Erosion and colluvial redeposition of the thick glaciolacustrine sediments in the upper canyon is common. This may take the form of major landslides or small deposits. Aeolian deposits cover the surface of all but the youngest landforms.

Site 45-DO-214 is on a low terrace, approximately 960 feet in elevation, or seven meters above the historic river level. The site has an elevational range of approximately 3 m, sloping up from the beach to the west, where an escarpment rising to the next terrace forms the western boundary of the site and the terrace. The surficial deposits on the terrace are mapped as recent loessic and colluvial deposits (Figure 2-1). However, this large scale mapping unit is not necessarily homogeneous at our scale of interest. Field data indicate that the river margin of the site is characterized by fluvial deposition rather than colluvial deposition, a finding quite in keeping with the site's elevation in relation to the river. The surface of Buckley Bar, just downstream from the site, is approximately the same elevation and is mapped as Columbia River Gravels (Figure 2-1).

PROCEDURES

Site 45-DO-214 was excavated and profiled in 1978, before the full-time stratigraphy crew took over profiling and sediment sampling. To achieve consistency in method among the sites, the stratigraphy crew reopened and reprofiled 22 2-m walls in June 1980. It was not possible to reprofile all of the walls because of time constraints. The profiles are from 12 of the 18 2 x 2-m units. All profiles but one are from the block excavation (Figure 2-2), and these, necessarily, are from exterior walls. Field notes were used to provide stratigraphic information for the rest of the site. A sequence of natural depositional units was defined for the block area, and then used as a basis for defining four cultural zones. Outside the block, cultural zones were defined for peaks of cultural material which could be traced from unit to unit. These were correlated to the sequence in the block on the basis of the

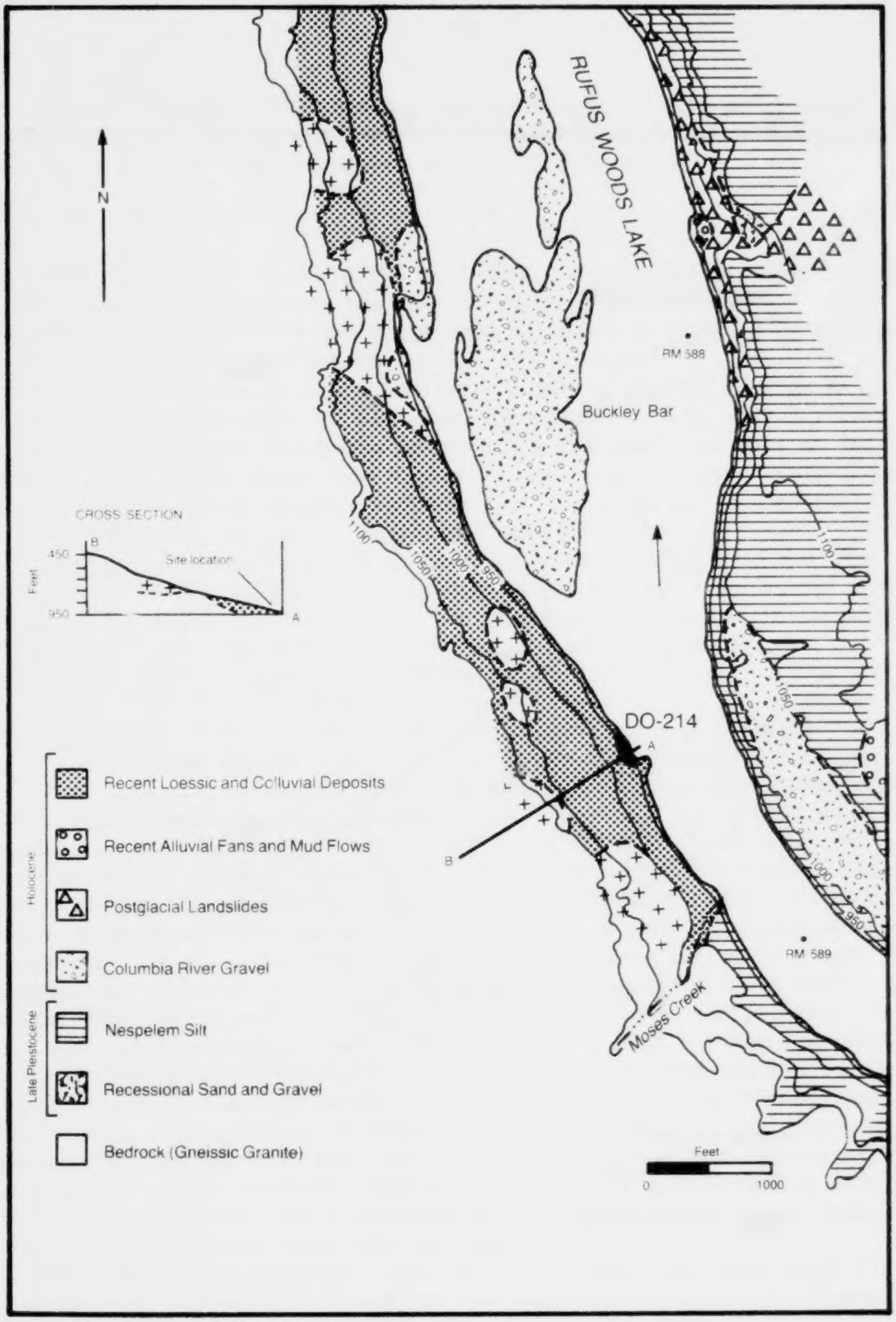

RUFUS WOODS LAKE
N
Buckley Bar
RM 588
RM 589
DO-214
A
B
Moses Creek
1100
1050
1000
950
CROSS SECTION
B
450
Feet
Site location
950
A
Holocene
Recent Loessic and Colluvial Deposits
Recent Alluvial Fans and Mud Flows
Postglacial Landslides
Columbia River Gravel
Late Pleistocene
Nespelem Silt
Recessional Sand and Gravel
Bedrock (Gneissic Granite)
Feet
0
1000

Figure 2-1. Geologic map of 45-DO-214 vicinity, 45-DO-214.

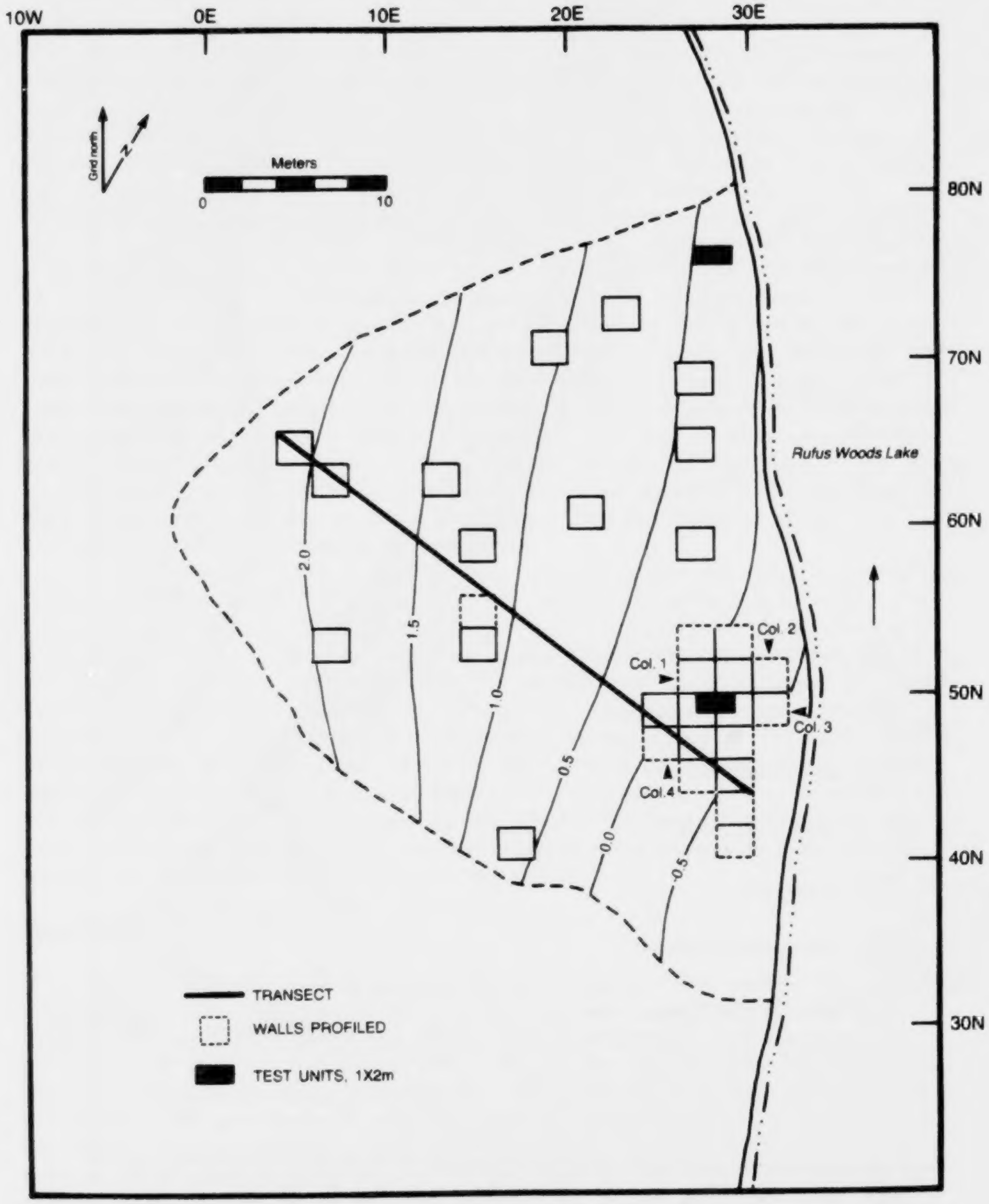

10W
0E
10E
20E
30E
Grid north
N
Meters
0
10
80N
70N
60N
50N
40N
30N
Rufus Woods Lake
2.0
1.5
1.0
0.5
0.0
-0.5
Col. 1
Col. 2
Col. 3
Col. 4
TRANSECT
WALLS PROFILED
TEST UNITS, 1X2m

Figure 2-2. Location of stratigraphic profiles, column samples, and transect, 45-DO-214.

stratigraphic information in field notes and the projectile point assemblages. Radiocarbon dates were obtained only from the block area and thus were not useful in establishing correlations among isolated units.

DEPOSITIONAL HISTORY

Because the block area has the best data, we discuss its depositional history before we reconstruct the depositional history outside the area. A representative profile from the block area is shown in Figure 2-3, and the stratigraphic descriptions are summarized in Table 2-1.

The oldest surface encountered in the block, a deposit of angular gravel with some pebbles and cobbles, has been termed Depositional Unit I (Table 2-1). The surface slopes downwards to the south and east, and only on the western margin of the block were excavation units deep enough to encounter it. The presence of angular gravels suggests that the material is a colluvial deposit from the slope above, perhaps reworked by water.

Above the lowest surface is a series of alternating coarse and fine sands, DU II. Three extensive, continuous subunits occur, the lowest being medium sands, the middle fine sands, and the uppermost medium to coarse sands. Intermittent lenses of varying textures occur between these strata. Concentrated bands of magnetite occur primarily in the lowest strata, and decrease to the west. The alternating textures are typical of lower bar deposits throughout the project area. The magnetite bands indicate lag deposition of heavy minerals on a previous shoreline. These strata are typical of upper bar deposits throughout the project area. The strata also contain angular gravels, shell fragments and occasional artifacts, probably lag deposits from the erosion and reworking of colluvial bank deposits.

A series of overbank deposits, DU III, occurs above the coarse basal river deposits. These generally massive strata can be divided into three block-wide subunits. The boundaries are evident in part because of cultural occupational debris, apparently marking briefly stable surfaces. Deposition was rapid as evidenced by radiocarbon dates and projectile point analysis. Discoloration of the matrix is due to localized cultural modification rather than development of soils. The lowest subunit, DU IIIa, is the most extensive and continuous of the three, with the most marked cultural occupation surface. The middle set of overbank deposits, subunit DU IIIb, contains traces of gravel, which distinguishes it texturally from the others. The uppermost, DU IIIc, is the thinnest and least continuous of the three; the natural strata have been culturally modified, resulting in such discontinuities as intrusive pits and stained areas. As a consequence, the stratigraphers gave these deposits many different field designations.

The uppermost depositional unit, DU IV, includes two flood deposits, evidently from the historic floods of 1894 and 1948. Neither flood deposit is completely continuous across the block--either the later or the earlier flood deposit may overlie DU III, and the two occur together only in some areas. Excavators recovered historic artifacts from these deposits. Discontinuous lenses of buried vegetation at the base of the flood deposits indicate that a stable surface occurred at the upper boundary of DU III.

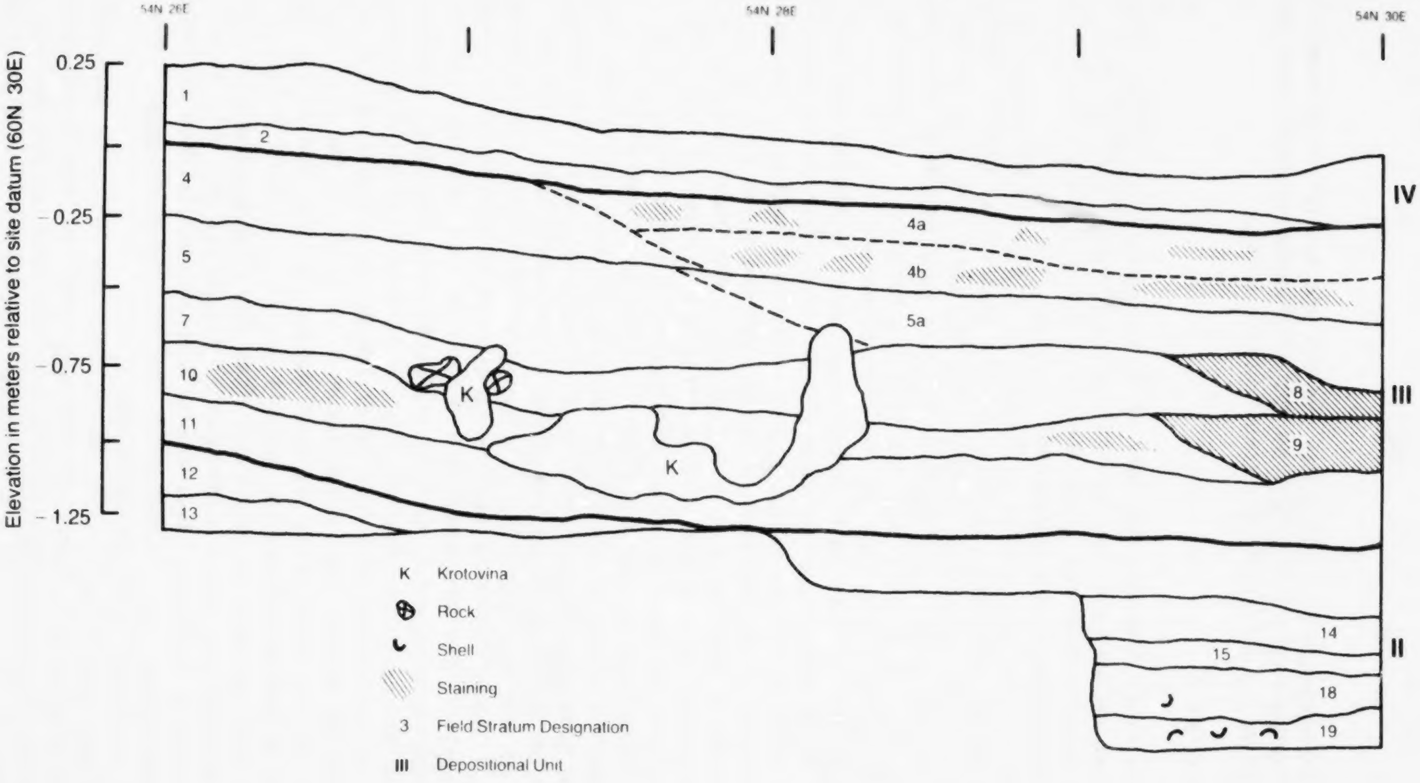

54N 26E
54N 28E
54N 30E
Elevation in meters relative to site datum (60N 30E)
0.25
-0.25
-0.75
-1.25
1
2
4
4a
4b
5
5a
7
8
9
10
11
12
13
14
15
18
19
K
K
IV
III
II
K Krotovina
Rock
Shell
Staining
3 Field Stratum Designation
III Depositional Unit

Figure 2-3. Representative stratigraphic profile from block excavation, 45-DO-214. See Table 2-1 for strata descriptions.

Table 2-1. Profile descriptions, block excavation only, 45-DO-214.

Depositional Unit	Type of Deposit	Subunit	Physical Description[1]
IV	Recent flood and aeolian deposits	IVc 1948 Flood	Upper flood deposit [21] 10YR5-3, fine to medium sand, well sorted, soft to loose, indistinctly laminated, 10-25 cm thick.
		IVb 1894 Flood	Lower flood deposit [1] 10YR6/2-6/3, fine to medium sand, well to moderately well sorted, soft to loose, boundary clear. Up to 20 cm thick to north, occurs as discontinuous lenses [20] where overlain by uppermost flood deposit.
		IVa Buried Surface	Discontinuous areas of buried litter mat [2, 22] at lower boundary of flood deposits, 10YR4/3-5/2, fine sand with decomposing organic fibers, boundary clear, smooth. Lenses are 1-4 m long, 2-7 cm thick.
III	Upper bar: Overbank deposits modified by wind and colluvial deposition	IIIc	Overbank deposit [3, 4, 23, 39], 10YR5/3-6/3-6/2 fine to medium sand, well to moderately well sorted, soft to loose, contains mica and magnetite, stratum is 10-30 cm thick. Numerous anthropogenic lenses [4a, 4b, 6, 26, 28, 29, 30, 31, 37]. Possible drainage channel is marked by lighter colored area, 10YR6/3-7/3 [24, 25] and a lens containing granite fragments [27].
		IIIb	Overbank deposit [7, 32, 33, 38] 10YR5/3-6/3, fine sand, well sorted to moderately well sorted, soft, some magnetite, 20-60 cm thick. Stratified in some areas with lower stratum slightly coarser sand and more gravel. Darker where modified by occupation [5, 5a, 8] 10YR5/2-6/2.
		IIIa	Overbank deposit [10, 11] with culturally modified upper portion [9]. Very fine to medium sand, 10YR6/3, well sorted, soft, some magnetite and mica, trace of gravel. Massive deposit 10-50 cm thick, thicker towards the north, continuous across block. Upper 10-20 cm is stained, 10YR5/2-4/2, with numerous cultural materials visible on the walls. Other anthropogenic lenses occur [34, 43, 44].
II	Lower bar: Channel and beach deposits	IIc	Medium to coarse sand [12, 13], salt and pepper, moderately to poorly sorted, 3-5% angular to subangular gravel, loose, graded bedding with gravel content increasing towards bottom. Stratum is 5-30 cm thick, thinner to the east but continuous across the block. Discontinuous lenses of medium to coarse sand with varying amounts of gravel, magnetite bands, and shell fragments [14, 15, 16, 17, 40, 42] occur on the lower boundary.
		IIb	Fine sand [18, 19], salt and pepper, well sorted, loose, some magnetite and occasional shell. Continuous across unit, 20-30 cm thick.
		IIa	Medium to coarse sand [41, 45, 46, 47, 48, 49] in the form of strata or lenses, moderately well sorted with frequent laminated magnetite bands, 10-50 cm thick.
I	Colluvial deposits		Gravel/cobble surface [50] too coarse for Munsell color, predominantly fine angular granitic gravel with some subrounded basalt and occasional pebbles and cobbles, poorly sorted, well compacted, boundary and thickness unknown.

[1] [ ] indicates strata numbers.

The stratigraphic units defined for the block can be traced outside the block to the north along the beach margin. Excavation units located below the 0.5 m surface contour line appear to have the same depositional history as the block area. However, the alluvial deposits of DU II and DU III pinch out rapidly uphill to the west, where a different sequence of deposits is evident (Figure 2-4). Using the limited stratigraphic data from the western portion of the site, we can distinguish only three stratigraphic layers with confidence: a lower cobble surface, a thick deposit of colluvial silty sand, and an upper aeolian deposit. Stratigraphic data and projectile point data permit us to correlate these units with the depositional units defined for the block.

The lowest deposit encountered outside the block area was a surface of cobbles and boulders in an orangeish sand matrix, found at the base of only the westernmost, highest excavation units. Because we have so little information about this deposit and no cultural material was associated with it, we did not give it a depositional unit designation.

The deposits in the western portion of the site are predominantly silty sand strata and lenses with varying amounts of angular gravel and containing numerous steeply sloping shell and rock concentrations. These strata may be as much as 1.5 m thick. The gravel content of the matrix increases from east to west towards the steep terrace front. The steep slopes of internal lenses and the ubiquitous occurrence of angular gravel suggest colluvial deposition. This deposit is assumed to be continuous with the steeply sloping deposit of angular gravel which has a limited occurrence in the block, hence both are assigned to DU I.

The surficial deposit is a light colored silty sand approximately 40 cm thick with associated historic materials. Given the active dunes on the site surface, it is probably an aeolian deposit. A dark brown sand at the base may represent a buried surface. Both the projectile points recovered from this deposit and the presence of historic materials indicate that it correlates with DU IIIc and DU IV in the block area.

CULTURAL ANALYTIC ZONES

The site was divided into four analytic zones that constitute a sitewide vertical sequence. Table 2-2 summarizes the zones and their relationship to the stratigraphic sequence, and lists their contents and radiocarbon dates. A schematic showing the vertical and horizontal location of the zones is shown in Figure 2-5. The zones are discussed individually below.

Test unit 50N/27E, a 1 x 2-m unit placed in the block, was zoned at the same time as the units from full-scale excavation so that complete spatial coverage of the block could be obtained for selected data categories. Although not all recovery procedures were comparable between testing and full-scale excavation, those for projectile points, features, flotation samples, and radiocarbon samples were the same.

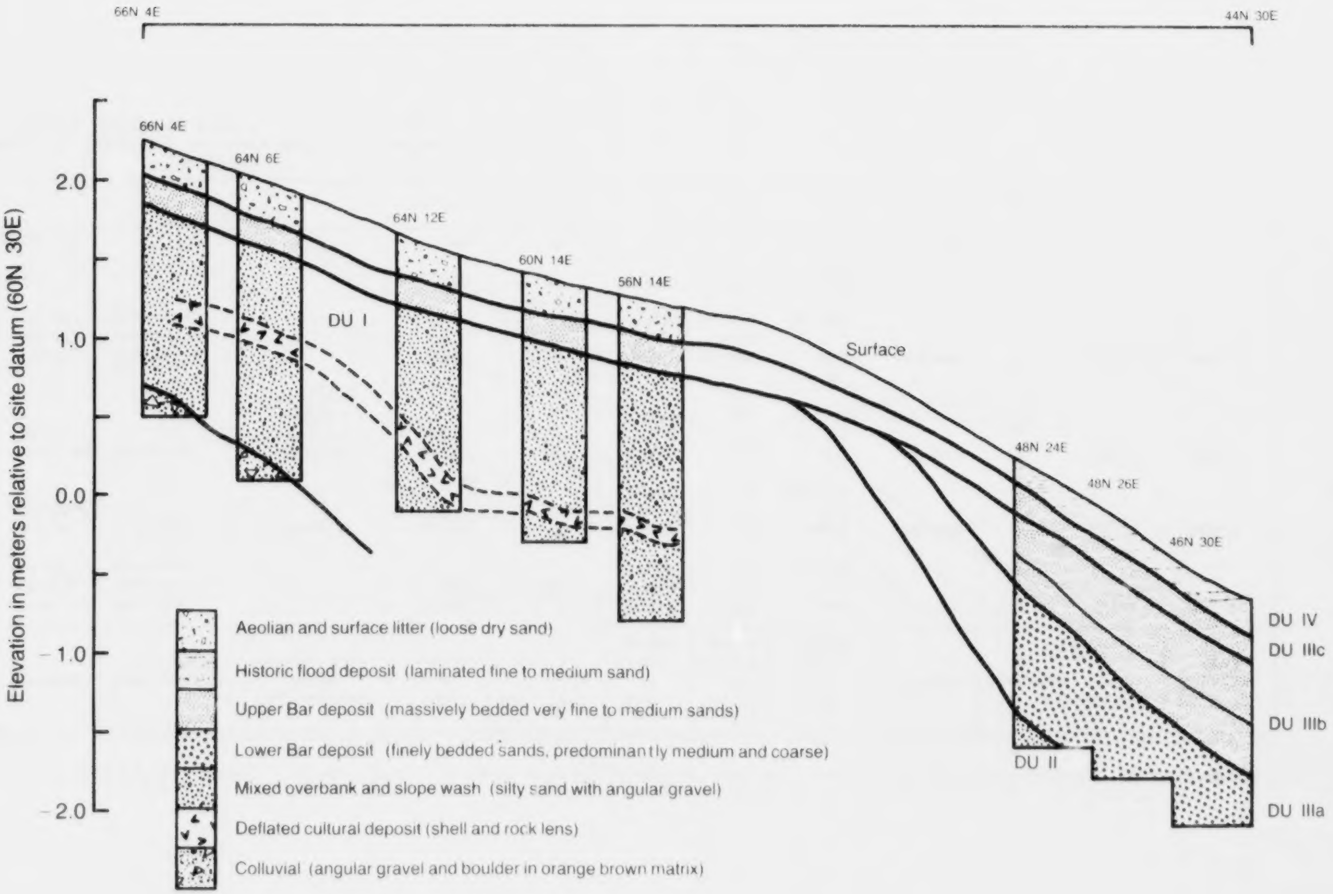

66N 4E
44N 30E
Elevation in meters relative to site datum (60N 30E)
2.0
1.0
0.0
-1.0
-2.0
66N 4E
64N 6E
64N 12E
60N 14E
56N 14E
48N 24E
48N 26E
46N 30E
DU I
Surface
DU II
DU IV
DU IIIc
DU IIIb
DU IIIa
Aeolian and surface litter (loose dry sand)
Historic flood deposit (laminated fine to medium sand)
Upper Bar deposit (massively bedded very fine to medium sands)
Lower Bar deposit (finely bedded sands, predominantly medium and coarse)
Mixed overbank and slope wash (silty sand with angular gravel)
Deflated cultural deposit (shell and rock lens)
Colluvial (angular gravel and boulder in orange brown matrix)

Figure 2-4. Schematic stratigraphic cross section, 45-DO-214. Orientation of transect shown on Figure 2-2.

Table 2-2. The analytic zones, 45-DO-214: their stratigraphic definition, radiocarbon dates, and contents.

Zone	DU	Stratum	Description	Radiocarbon[1] Dates (Years B.P.)	Lithic # Row %	Nonlithic # Row %	Bone # Row % grams	Shell # Row % grams	FMR # Row % grams	Total[2]	Features #	Volume (m^3)	Density Objects (m^3)
1	IV IIIc	1-4, 6, 20-31, 37,39	Aeolian, recent flood, overbank		3,184 28.8	7 0.1	7,433 66.4 1,671	228 2.0 222	341 3.0 62,158	11,201	5	63.3	177.0
2	IIIb	5,7,8 32,33,38	Overbank	1170±71	5,684 20.6	12 0.04	20,776 75.2 6,630	114 0.4 119	1,056 3.8 222,583	27,642	3	31.3	883.1
3	IIIa	9-11,34 43,44	Overbank	1046±60 1112±71 1122±84 1151±168	5,482 18.6	82 0.3	23,481 79.4 9,369	215 0.7 205	237 0.8 50,133	29,517	7	33.3	886.4
4	I,II	12-19, 40-42, 45-50	Channel & beach, colluvial		2,086 15.1	6 0.4	4,304 31.1 1,427	7,193 51.9 21,516	264 1.9 43,243	13,853	4	63.1	219.5
Subtotal (count)					16,456	107	56,004	7,748	1,898	82,213			
Unassigned Material					91	0	12	25	3	131	1		
TOTAL					16,547	107	56,016	7,773	1,901	82,344	20		

[1] See Appendix A, Table A-1 for more detail on radiocarbon samples.

[2] Does not include historic material or miscellaneous.

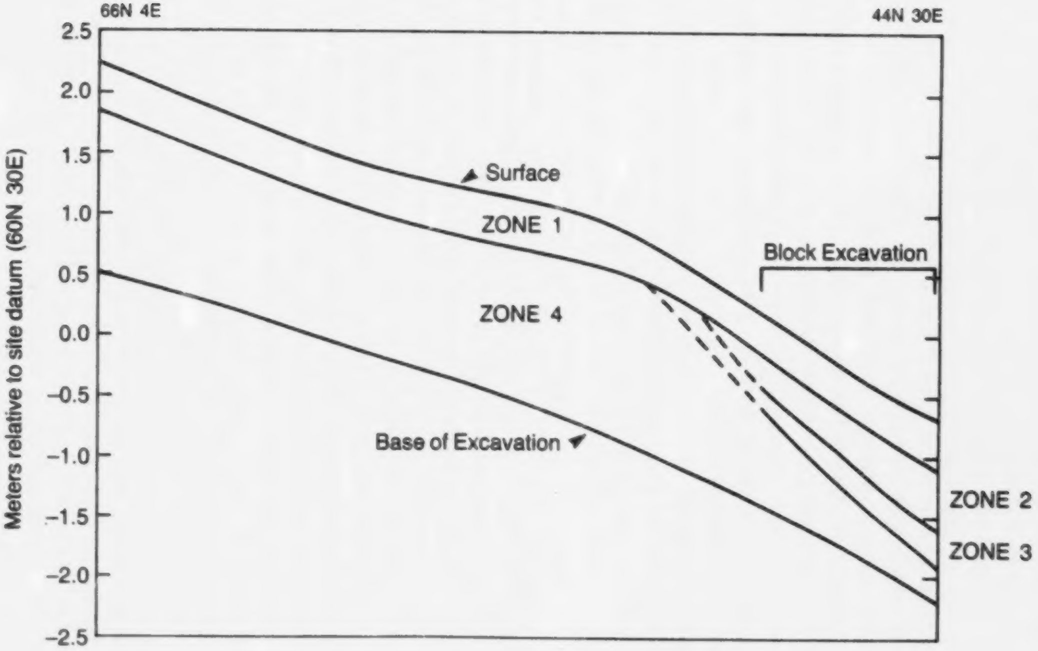

66N 4E
44N 30E
Meters relative to site datum (60N 30E)
2.5
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.5
Surface
ZONE 1
ZONE 4
Base of Excavation
Block Excavation
ZONE 2
ZONE 3

Figure 2-5. Schematic cross section of 45-DO-214 showing vertical and horizontal location of analytic zones, 45-DO-214.

ZONE 4

The assemblages of cultural materials from DU I and DU II were both included in Zone 4. Most materials are from DU I, which contained what may be a primary cultural deposit, with Hudnut Phase points similar to Frenchman Springs Phase styles on the Middle Columbia (Nelson 1969). The succeeding river deposit, DU II, contains redeposited cultural materials with similar projectile point styles.

Most DU I materials are from the western portion of the site, where numerous shell lenses and other artifacts occur in colluvial deposits. In most of the excavation units, several distinct peaks of cultural materials were evident within the 1.0-1.5 m thick deposits. Stratigraphic data did not allow us to correlate these peaks between units, so the cultural materials were not divided into separate zones. The four features recorded from Zone 4 occur in the western uphill portion of the site. Only a negligible volume of DU I occurred in the block area.

The river-deposited coarse sands of DU II also contained cultural materials, similar to those of DU I. The artifacts probably were incorporated in the river deposits as a lag deposit from erosion of the DU I bank.

ZONE 3

Zone 3 corresponds to DU IIIa, an overbank deposit that overlies the channel deposits of DU II. As in the case of Zone 2, the cultural occupation is associated with the upper surface of the alluvial deposit, visible in the field as a dark stained layer 10-15 cm thick, overlying a 15-50 cm thick layer of unstained alluvium. The upper surface of this alluvial deposit was the most stable of the surfaces below the upper surface of DU IIIc; it is the most conspicuous, uniform, and continuous stain noted in the block excavation. The density of cultural material drops off rapidly below this surface. The assemblage of lithics, bone, shell, fire-modified rock, and seven features is the largest from the site.

The **in situ** prehistoric deposit of Zone 3 is dated to between 1000 and 1200 B.P. by four radiocarbon dates (1022±64 B.P., TX-3393; 1046±60 B.P., TX-3392; 1112±71 B.P., TX-3395; 1151±68 B.P., TX-2898). Although Zone 3 is stratigraphically lower than Zone 2, and has a distinct occupation surface and peak of cultural materials, radiocarbon dates indicate that the two zones are nearly contemporaneous. Apparently DU IIIa and DU IIIb were deposited very rapidly. The excellent preservation of features and bone artifacts in Zone 3 in particular probably is due to rapid burial.

ZONE 2

Zone 2 was defined to include cultural materials in DU IIIb. These overbank deposits occur only in the eastern part of the site, including the block area. A dense cultural occupation is associated with the upper surface of the alluvial deposit, apparently laid down rapidly and unevenly across the block area. Where the natural deposit is thin, the dark stained cultural surface may directly overlie the dark stained surface of Zone 3 below; in other areas, sterile alluvium underlies the cultural surface. The assemblage of cultural materials, one of the two largest at the site, is composed of bone, shell, lithics, fire-modified rocks and three features. Two items of historic manufacture, a fence nail and a piece of copper that is probably an exploded shell jacket, were recovered from Zone 2 and are assumed to be present due to disturbance. A radiocarbon age of 1170±71 B.P. (TX-3394) was determined on a sample from Feature 9 in this zone.

ZONE 1

Zone 1 includes cultural materials from the two uppermost depositional units at 45-DO-214, DU IV and DU IIIc. The two deposits are separated by a stable 20th century surface and are different in age. Depositional Unit IIIc yielded an assemblage composed of historic materials, lithics, bone, shell, fire-modified rock, and five features. Depositional Unit IV, a thin layer of recent flood deposits and aeolian deposits overlying the stable upper surface of DU IIIc, contained a small assemblage of approximately 600 lithics, fire-modified rock, shell, bone, and historic materials, and no features. There are no radiocarbon dates for Zone 1; we know only that it dates between 1000 B.P., the age of Zone 2, and modern times.

A small assemblage of historic artifacts was found in DU IV and within a short vertical distance of the stable upper surface of DU IIIc. Of the twenty-six artifacts, 16 relate to fence construction and hunting--nine fence nails, 2 pieces of wire, a wooden post, and four shell casings. The other items--one piece of glass, a coathanger, a tin box, a railroad spike, a screw, a nail, two pronged discs, a piece of rusty metal, and a toilet tissue wrapper--are more varied, but do not suggest domestic activities. One posthole was noted, extending down from the upper surface of DU IIIc.

We assume that the DU IIIc assemblage derives from prehistoric use of the area. Although the source of materials in DU IV is uncertain, their sparseness rules out a cultural occupation. Some of the items result from historic use of the area while others probably are older materials brought to the surface by disturbance, such as the posthole mentioned below. Inclusion of the few DU IV materials in Zone 1 should not bias the analysis of the occupation recovered from DU IIIc. Historic use of the area apparently has had little impact on the prehistoric materials except for the deposition of a limited range of artifacts and excavation of occasional postholes.

SUMMARY

The depositional histories of the eastern and western portions of the site differ. The oldest deposits are found in the western, or higher, portion of the site where colluvial deposition has been active. The younger river sediments in the eastern half of the site record the erosion of the colluvial deposits by a westward migration of the Columbia River, and the subsequent laying down of overbank deposits as the river withdrew to the east. No single unit documents the boundary; however, the dissimilarity of units on either side places it somewhere between the 0.5 m and 1.0 m surface contours.

In the western portion of the site, the oldest deposits are angular cobbles and boulders in a matrix of coarse, oxidized granite sand. These are culturally sterile and have not been analyzed in detail. Above them is a thick profile of brownish-gray, very fine silty sands with abundant fine, angular gravel, deposited by colluvial action from further upslope. In these sediments are artifacts that represent a Hudnut Phase component (4000-2000 B.P.).

Some time after 2000 B.P. the Columbia River migrated far enough to the west to erode the colluvial materials. In the eastern part of the site, channel and beach deposits--finely bedded coarse to fine sands with heavy mineral concentrations--overlie a surface of angular gravel, the easternmost extent of the colluvial deposit. Erosion of the older colluvial deposit is indicated by the incorporation of Hudnut Phase points in the lower bar sediments as lag deposits. By 1200 B.P., the river had withdrawn further from the bar and finer overbank deposits were laid down; the overlying matrices in the eastern portion of the site consist of fine, light-colored sands with low gravel content. Depositional Units IIIa and IIIb represent nearly a meter of overbank deposits containing cultural features and occupation surfaces dating between 1200 and 1000 B.P. The rapid deposition helped preserve the cultural deposits.

The latest occupation of the site occurs in both its western and eastern areas. Although the upper deposits of the two areas can be correlated on the basis of projectile points, they were laid down differently. Aeolian deposition determined the character of the western half, while Columbia River flooding intermittently affected the eastern half. The rate of overbank deposition slowed and sometime prior to 1894, aggradation ceased long enough for an A1 horizon to develop. In the eastern half of the site the flood deposits of 1894 and 1948 overlie this horizon.

3. ARTIFACT ANALYSES

Excavations at 45-DO-214 recovered 82,344 objects, most of which are the direct evidence of human activity. The purpose of this chapter is to present systematically the results of analyses of lithic and bone objects modified by, or resulting from, use or manufacture. These analyses provide data for interpreting site activities within a temporal framework, and for making comparisons within the project area and within the region.

The artifact assemblage is divided into bone, shell, fire-modified rock (FMR), non-lithic modified artifacts including shell, bone and fiber, and modified lithic artifacts (Table 2-2). FMR and shell, as well as bone that cannot be identified to species, have been counted and weighed. Identifiable faunal remains are discussed in Chapter 4 and botanical remains including fiber are discussed in Chapter 5.

The lithic artifacts have been analyzed from two perspectives. The technological analysis focuses on the raw materials and the by-products of manufacturing, allowing us to infer the methods used to fashion stone implements. The functional analysis describes traces on manufactured objects as well as unmodified objects resulting from use, thus providing evidence about activities. These artifacts represent the tools used for particular activities rather than the by-products of manufacture.

Throughout these analyses reference is made to formal categories of tool types (Table 3-1). The types have been recognized on the basis of traditional technological, morphological, and functional characteristics. These descriptive labels often imply an explicit, exclusive function. Functional analysis confirms, limits or expands the interpretation of the use of the objects. The named types, then, are convenient labels for kinds of artifacts found frequently in the archaeological record.

A third analysis, the examination of stylistic variation among projectile points, was applied to a limited group of artifacts. The morphology of projectile points, especially the basal elements, is known to vary within functional limits. The variation has historic significance; when correlated with radiocarbon dates, style becomes a useful temporal marker.

The final analysis describes bone artifacts modified for or by use. Identifiable shaped bone artifacts are rare in the project area, yet 45-DO-214 has a number of well preserved specimens, most coming from a single feature.

Details of methods and procedures used to develop these analyses are presented in the research design (Campbell 1984d). They will be re-evaluated in the synthesis report.

Table 3-1. Formal object types sorted by zone, 45-DO-214.

Artifact	Zone 1		Zone 2		Zone 3		Zone 4		Total[1]
	N	Col %	N	Col %	N	Col %	N	Col %	N
Lithic Formed Objects									
Projectile point	34	44.7	39	27.8	34	30.1	13	18.3	120
Biface	32	42.1	71	50.7	54	47.8	23	32.4	180
Drill	–	–	3	2.1	–	–	1	1.4	4
Graver	2	2.6	3	2.1	2	1.8	–	–	7
Scraper	–	–	7	5.0	8	7.1	–	–	15
Spokeshave	1	1.3	–	–	–	–	–	–	1
Tabular knife	6	7.9	14	10.0	11	9.7	32	45.1	63
Adze	–	–	–	–	1	0.9	1	1.4	2
Maul	–	–	–	–	1	0.9	–	–	1
Pipe	–	–	1	0.7	2	1.8	–	–	3
Stone bead	1	1.3	2	1.4	–	–	1	1.4	4
Subtotal	76	100.0	140	100.0	113	100.0	71	100.0	400
% Zone Total		2.4		2.5		2.1		3.4	
Lithic Worn/Modified Objects									
Chopper	1	0.6	–	–	1	0.3	2	1.3	4
Hammerstone	–	–	3	1.1	1	0.3	4	2.6	8
Anvil	1	0.6	1	0.4	–	–	–	–	2
Flaked cobble	1	0.6	–	–	–	–	3	2.0	4
Abrader	0	–	1	0.4	8	2.7	–	–	9
Utilized flakes	116	67.8	202	71.4	208	69.4	86	55.8	613
Unifacially retouched flake	15	8.8	30	10.6	39	13.0	21	13.6	105
Bifacially retouched flake	20	11.7	21	7.4	18	6.0	9	5.8	68
Core	0	–	2	0.7	5	1.7	4	2.6	11
Resharpening flake	7	4.1	12	4.2	10	3.3	3	2.0	32
Linear flake	8	4.7	4	1.4	5	1.7	6	3.9	23
Indeterminate	2	1.2	7	2.5	5	1.5	16	10.4	30
Subtotal	171	100.0	283	100.0	381	100.0	154	100.0	909
% Zone Total		5.3		5.0		5.5		7.4	
Lithic Debitage									
Conchoidal flake	2,662	90.3	4,794	91.1	4,485	88.3	1,488	79.9	13,427
Tabular flake	147	5.0	238	4.4	251	4.9	215	11.5	843
Chunk	138	4.7	237	4.5	342	6.7	168	8.8	877
Subtotal	2,947	100.0	5,261	100.0	5,078	100.0	1,861	100.0	15,147
% Zone Total		92.3		92.5		92.4		89.2	
TOTAL	3,194		5,684		5,482		2,086		16,456
Non-Lithic Objects									
Bone artifacts	4	57.1	8	66.7	61	74.4	1	16.7	74
Woven fiber	–	–	–	–	18	22.0	–	–	18
Dentalium	–	–	–	–	1	1.2	–	–	1
Ocher	3	42.9	4	33.3	2	2.4	5	83.3	14
Subtotal	7	100.0	12	100.0	82	100.0	6	100.0	187
TOTAL MATERIALS	3,281		5,708		5,574		2,092		16,583

[1] Does not include <1/4 in flakes and unassigned lithic objects.

TECHNOLOGICAL ANALYSIS

In the technological analysis, the following dimensions were examined: object type, material type, technological condition, dorsal topography and material condition. The variables of each dimension are presented in Appendix B, Table 1.

Table 3-2 presents kinds and frequencies of lithic material from 45-DO-214. Jasper, chalcedony and petrified wood are cryptocrystalline silicas formed by similar processes and have similar strength, flexibility and flaking characteristics (Crabtree 1967). The first two are available along escarpments of the basalt plateau at a moderate distance from the site. Obsidian and petrified wood are exotic materials not locally available. Their presence is of note despite low frequencies. Quartzites and basalts are locally available from river gravels and glacial tills. The remaining materials occur in extremely low frequencies and most are also locally available.

Cryptocrystalline silicas obviously make up most of the collection in each analytic zone, followed by quartzites and basalts. Frequencies among zones vary, sometimes significantly . Table 3-3 presents ratios of relative frequencies of material types by analytic zone. Changes in the ratios may represent use of different raw materials as a result of cultural preterence or functional necessity. The greatest difference in the ratio of chalcedony and jasper occurs between Zone 2 and Zone 4. Lesser differences occur between Zones 1 and 4 and Zones 2 and 3. Because the two materials have such similar flaking properties, these differences most likely are associated with local procurement options rather than functional preference. It should be noted that the differences are relatively minor and the ratios of these two materials could be dramatically affected by the recovery of debitage from a single reduction event (c.f. Henry, et al. 1976).

Ratios for fine-grained quartzite and coarse-grained quartzite are most different between Zone 2 and Zone 3, but this value is less than the greatest difference between jasper and chalcedony. There are slighter differences between Zones 2 and 4 and Zones 1 and 3. Overall, there is more fine-grained quartzite in Zones 3 and 4.

The ratios for basalts are the most diverse among the analytic zones of all the material types, reflecting the smaller sample size. Zone 1 is very different from all of the other zones.

The ratios of major classes of material among analytic zones tells us more about functional variation and selection. Ratios of quartzite to cryptocrystalline silica are consistent among the zones except for Zone 4 where quartzite artifacts occur more frequently. Basalt also occurs more frequently in Zone 4 than elsewhere. Comparison of the basalt:quartzite ratio shows variability again probably related to the basalt sample size. The greater contrast is between Zone 1 and Zone 2 with slightly smaller differences between Zone 1 and Zone 3, and Zone 2 and Zone 4.

Ratios also were calculated to determine if basalt and quartzites were interchangeable in their fine- and coarse-grained forms. Interestingly, the coarse-grained ratios are similar while the fine-grained ratios are more

Table 3-2. Frequency of lithic material type by zone, 45-DO-214.

Material	Zone				Total[1]
	1	2	3	4	
Jasper	2,344	4,089	4,094	1,406	11,933
Chalcedony	596	1,177	885	246	2,904
Petrified wood	7	13	10	3	33
Obsidian	4	1	–	9	14
Coarse quartzite	149	254	285	259	947
Fine quartzite	23	33	52	42	150
Coarse basalt	12	18	23	19	72
Fine basalt	14	40	37	30	121
Granitic	3	4	2	3	12
Sandstone	1	1	11	–	13
Nephrite	–	1	1	1	3
Siltstone	–	2	0	10	12
Steatite	–	1	1	–	2
Indeterminate	41	50	91	58	240
TOTAL	3,194	5,684	5,492	2,086	16,456

[1] Does not include <1/4 in flakes and unassigned lithic objects.

Table 3-3. Ratios of relative frequencies of lithic materials[1] by zone, 45-DO-214.

Material	Zone				Total
	1	2	3	4	
Chalcedony/Jasper	0.255	0.288	0.216	0.175	0.230
Fine quartzite/ Coarse quartzite	0.149	0.133	0.173	0.161	0.155
Coarse basalt/ Fine basalt	1.000	0.429	0.571	0.643	0.571
Quartzite/CCS	0.059	0.055	0.067	0.182	0.074
Basalt/ CCS	0.009	0.011	0.012	0.029	0.013
Basalt/Quartzite	0.148	0.196	0.180	0.160	0.179
Fine basalt/ Fine quartzite	0.571	1.167	0.778	0.700	0.778
Coarse basalt/ Coarse quartzite	0.085	0.067	0.076	0.073	0.690

[1] Other classes not contrasted because of low frequencies.

diverse. The ratios suggest that coarse-grained basalt and quartzite may be used interchangeably. The fine-grained forms, however, are not. At its best, fine-grained basalt is more similar in working characteristics to cryptocrystalline silicas than to fine-grained quartzites. This characteristic is reflected elsewhere in the Plateau archaeological record where certain time periods (e.g., the Cascade Phase, Leonhardy and Rice 1970) are characterized by the greater use of fine-grained basalt for even the most delicate tools. In contrast, fine-grained quartzite appears occasionally in finely manufactured artifacts but never in an abundance to match the material availability.

Two parallel systems of lithic production based on material type apparently were used at 45-DO-214. Cores, specialized flakes, debitage, and the formed objects provide information about these systems.

The first system consists of the bifacial reduction of materials with pronounced, predictable conchoidal flaking characteristics. Sequential stage models have been developed elsewhere to describe this process of manufacture (Holmes 1919; Sharrock 1966; Muto 1971; Womack 1977; Callahan 1979). Basically, they involve the same process: the acquisition of raw materials and their reduction through increasingly refined bifacial forms to the desired product. Each stage of the model has characteristic products and by-products. Primary flakes show weathered or rind surfaces of the original exterior on all or portions of their dorsal surfaces. Secondary flakes lack cortex and show only scars of previously detached flakes on their dorsal surfaces. Predictably, cores discarded earlier in the sequence exhibit cortex while those discarded later do not. Flakes removed toward the latter portion of the sequence as bifaces are formed have a diagnostic appearance. They may be recognized because the dorsal surface retains a scar from earlier secondary flake detachment, the ventral surface is smooth, and the striking platform retains a portion of the biface edge. In the final stages of manufacture, small, thin flakes are removed by the pressure technique and the desired tool is formed. This reduction process is illustrated in Figure 3-1.

The second system of reduction is similar to the first except that large flakes from locally available cobbles and the modified cobbles themselves are the desired products. Since it represents an "indulgent" system based on readily available resources (MacDonald 1971), extensive modification and reuse of the products in this system is less likely to occur (Figure 3-2).

During any stage of either system, the products of reduction may be modified and used, put directly to use, or discarded. Discarded items can re-enter the main sequence. Each modification results in smaller waste flakes indistinguishable from other by-products. When worn lithics are rejuvenated, characteristic flakes, retaining the wear removed from the parent object, are produced. In both systems, debitage tends to decrease in size and increase in number at each successive stage of reduction.

Various formal categories of artifacts used to classify the 45-DO-214 assemblage demonstrate use of both systems. Cores, bifaces, primary flakes and secondary flakes are classified by the same terms in the project area system. Preforms are classified as Type 2 in the project stylistic analysis of projectile points. Linear flakes, manufactured by pressure flaking,

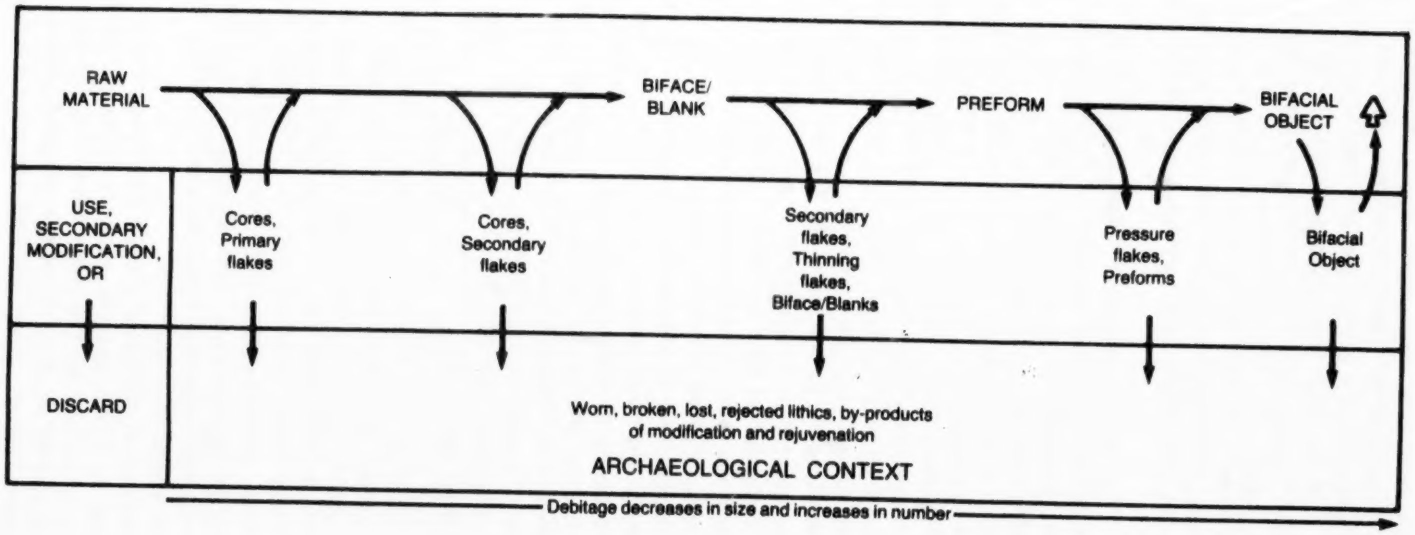

RAW MATERIAL
BIFACE/ BLANK
PREFORM
BIFACIAL OBJECT
USE, SECONDARY MODIFICATION, OR
Cores, Primary flakes
Cores, Secondary flakes
Secondary flakes, Thinning flakes, Biface/Blanks
Pressure flakes, Preforms
Bifacial Object
DISCARD
Worn, broken, lost, rejected lithics, by-products of modification and rejuvenation
ARCHAEOLOGICAL CONTEXT
Debitage decreases in size and increases in number

Figure 3-1. Schematic of the bifacial reduction process, 45-DO-214.

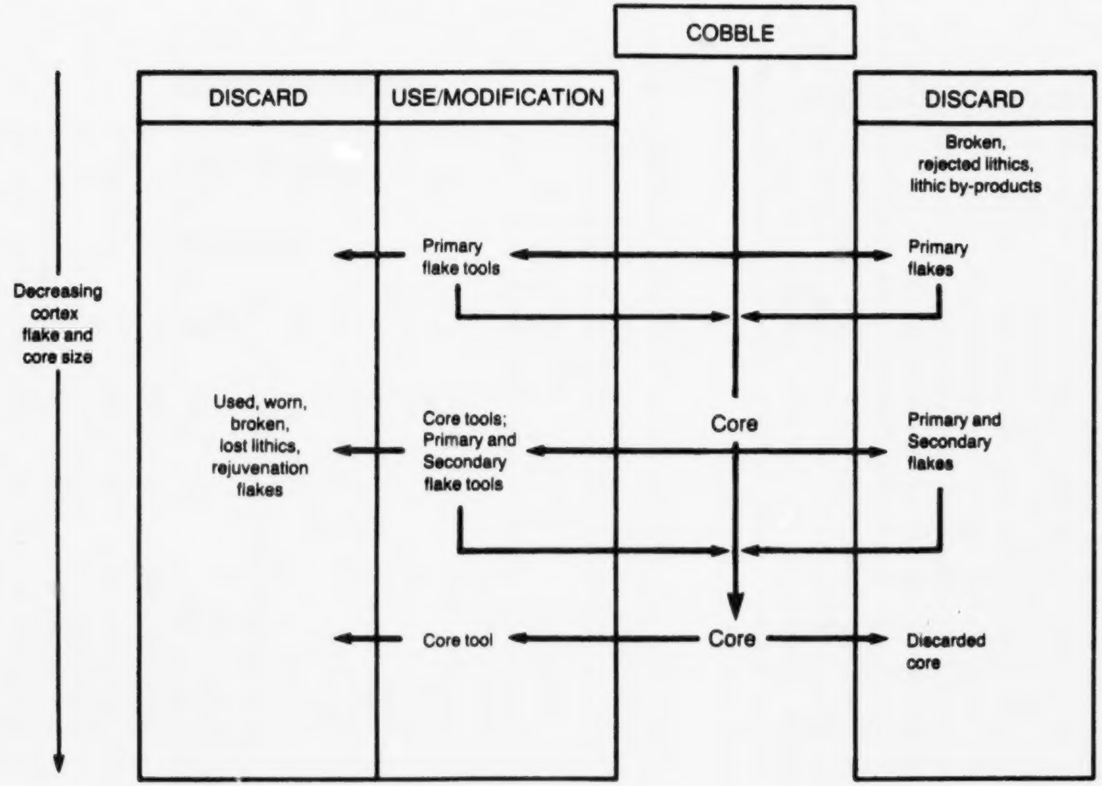

COBBLE
DISCARD
USE/MODIFICATION
DISCARD
Broken, rejected lithics, lithic by-products
Decreasing cortex flake and core size
Primary flake tools
Primary flakes
Used, worn, broken, lost lithics, rejuvenation flakes
Core tools; Primary and Secondary flake tools
Core
Primary and Secondary flakes
Core tool
Core
Discarded core

Figure 3-2. Schematic of the cobble reduction process, 45-DO-214.

represent final reduction. Flakes <1/4 inch in size also can be associated with the later stages of reduction. In the project system, the classification "resharpening flakes" includes bifacial thinning flakes and flakes from tool rejuvenation. The bifacially and unifacially retouched flakes and the utilized flakes are by-products of the sequence that have been modified or used. Each major material type found at 45-DO-214 was treated somewhat differently within the reduction systems. Size attributes, kinds of debitage, and percentages of primary flakes and flakes <1/4 in are presented for the major material types in Figures 3-3, 3-4, 3-5 and 3-6. Sample size , basic statistics , and zone information are included in Appendix B.

Products of the bifacial reduction system are obvious in the CCS assemblage (Table 3-4). In addition to formed objects such as projectile points and bifaces, cores and all of the specialized kinds of flakes occur. Most debitage is made up of conchoidal flakes, reflecting the characteristic breakage of the material. These flakes are smaller than the quartzite or basalt debitage. The proportion of <1/4 in flakes is greater than for the quartzite or basalt materials. Cryptocrystalline debitage shows the lowest frequency of primary flakes. These factors indicate the later stages of the bifacial reduction system.

Table 3-4. Cryptocrystalline artifacts by zone, 45-DO-214.

Object Type	Zone				Total[1]
	1	2	3	4	
Formed Objects					
Projectile point	34	38	32	12	116
Biface	31	69	51	21	172
Drill	–	3	–	1	4
Graver	2	3	2	–	7
Tabular knife	–	1	–	–	1
Scraper	–	6	8	–	14
Spokeshave	1	–	–	–	1
Subtotal	68	120	93	34	315
Cores and Modified/Specialized/Worn Objects					
Cores	–	2	5	4	11
Utilized flake	114	197	205	85	601
Unifacially retouched flake	15	30	37	19	101
Bifacially retouched flake	19	20	17	8	64
Resharpening flake	7	12	10	3	32
Linear flake	8	4	5	6	23
Indeterminate	2	4	2	3	11
Subtotal	165	269	281	128	843
TOTAL	233	389	374	162	1,158

[1] Does not included <1/4 in flakes and unassigned lithic objects.

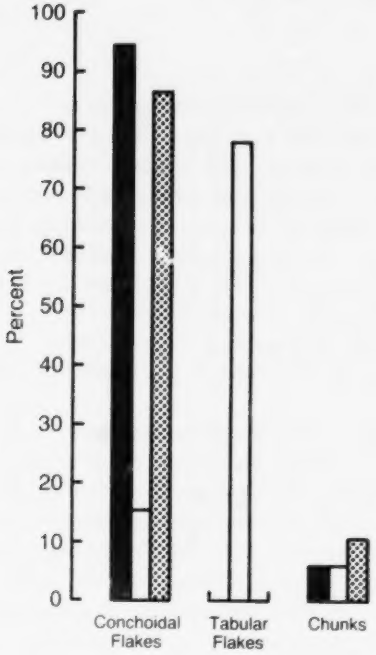


Figure 3-3. Kind of debitage by material type, 45-DO-214.

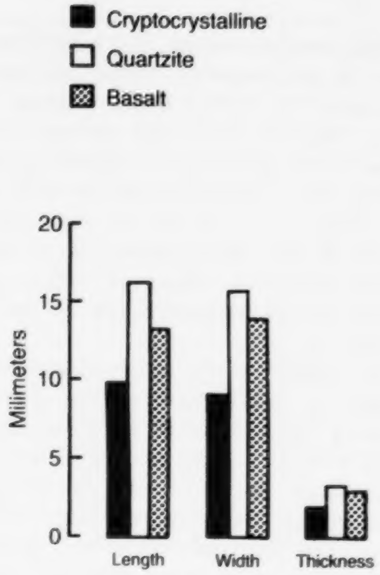


Figure 3-4. Size attributes of conchoidal flakes, 45-DO-214.

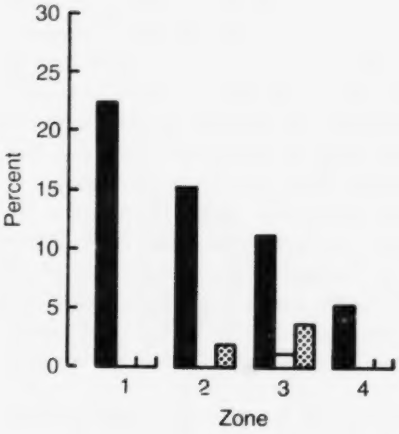


Figure 3-5. Relative frequency of <1/4 in flakes by zone, 45-DO-214.

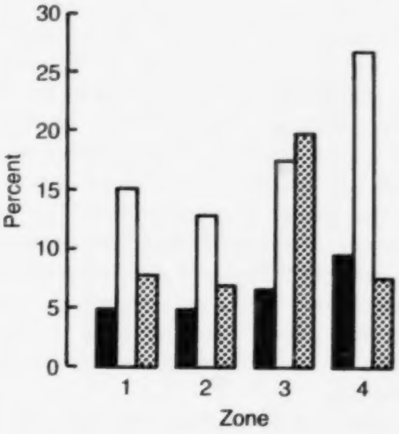


Figure 3-6. Proportion of primary flakes by zone, 45-DO-214.

The second system of reduction applies to the quartzite materials. Tabular knives made on large laminar flakes are the only formed objects made from quartzite (Table 3-5). Cores, resharpening flakes, and linear flakes are absent. Cobble tools and percussion implements make up the other artifacts. The quartzite debitage is made up of primarily tabular flakes, reflecting the characteristic breakage pattern of the material. The conchoidal flakes are larger than those of CCS or basalt. The proportion of <1/4 in flakes is the smallest of the three material types. Cortex is most frequent in this material category. However, it is not a dominant characteristic of the debitage, which suggests use of secondary flakes and interior portions of the cobbles.

The basalt portion of the assemblage reflects use of both systems although the small sample size should make us cautious in our interpretation. Bifacially manufactured objects as well as a tabular knife, cobble tools, and milling and anvil stones were recovered (Table 3-5). There are no basalt cores, resharpening flakes, or linear flakes. Like the CCS, the debitage is made up primarily of conchoidal flakes. The size of the flakes is intermediate between the cryptocrystalline silicas and the quartzites as is the frequency of primary flakes. The <1/4 in flakes make up a small proportion of the debitage.

Of the remaining artifacts, ten are made of granite, which is similar in availability and material characteristics to coarse-grained quartzite (Table 3-6). These artifacts are similar in type to those of the coarse-grained quartzite. The rest of the artifacts are specialized in form and manufacture and influenced by their material. Two nephrite adzes, a nephrite bead and the two steatite pipes required specialized techniques of grinding and polishing to produce them as well as a material amenable to such techniques. Abraders offer an obvious example of the relation between material type and function. The indeterminate objects are primarily siltstone or mudstone concretions of varying shapes. These items do not occur naturally in the kinds of matrices found at 45-DO-214, though they do occur in the nearby Nespelem silts. We cannot say whether they were collected as curiosities or for a purpose.

The final dimensions of the technological analysis, condition and treatment, indicate that the assemblage is highly fragmented and that thermal alteration to improve lithic quality was not a common practice in any of the occupations. The percentages of complete artifacts are relatively consistent among the zones ranging from 32.5% in Zone 2 to 38.5% in Zone 4. Evidence of burning or dehydration was found for 6.6% (Zone 1) to 7.2% (Zone 4) of the artifacts.

The technological systems employed at 45-DO-214 do not vary exceptionally among the zones. The lithic materials consistently were used in the same manner. The finely wrought, most modified objects such as bifaces, projectile points, drills, gravers and scrapers tend to be manufactured almost entirely from CCS. Quartzite was used for minimally modified objects such as tabular implements, choppers and hammerstones. Basalt objects include both finely manufactured artifacts such as bifaces and projectile points and minimally modified artifacts such as tabular knives and an anvil.

Table 3-5. Quartzite and basalt artifacts by zone, 45-DO-214.

Object Type	Zone 1		Zone 2		Zone 3		Zone 4		Total	
	Quartzite	Basalt	Quartzite	Basalt	Quartzite	Basalt	Quartzite	Basalt	Quartzite	Basalt
Formed Objects										
Projectile point	–	–	–	1	–	2	–	1	–	4
Biface	–	–	–	–	–	2	–	1	–	3
Tabular knife	6	–	10	1	11	–	30	1	57	2
Scraper	–	–	1	–	–	–	–	–	1	–
Maul	–	–	–	–	1	–	–	–	1	–
Chopper	–	–	–	–	1	–	1	1	2	2
Subtotal	6	1	11	2	13	4	31	4	61	11
Worn/Modified Objects										
Peripherally flaked cobble	–	1	–	–	–	–	1	2	1	3
Hammerstone	–	–	–	–	–	–	2	–	2	–
Anvil	–	–	–	1	–	–	–	–	–	1
Subtotal	–	1	–	1	–	–	3	2	3	4
Modified/Specialized/Worn Flakes										
Bifacially retouched flake	1	–	–	1	–	–	–	–	1	1
Unifacially retouched flake	–	–	–	–	2	–	–	2	2	2
Utilized flake	2	–	2	1	3	–	–	1	7	2
Indeterminate	–	–	–	–	1	1	–	1	1	2
Subtotal	3	–	2	2	6	1	–	4	11	7
TOTAL	9	2	13	5	19	5	34	10	75	22

Distribution of the artifacts underscores the major contrast among the zones first noted in the distribution of material types. The greater proportion of quartzite and basalt in Zone 4 is reflected in the greater frequency of tabular knives and cobble tools and relatively fewer projectile points, bifaces and scrapers than in the other zones. The debitage also reflects this contrast. Tabular flakes, which are most often quartzite or basalt, are more common in Zone 4 and conchoidal flakes less so. The debitage in general makes up a slightly lower percentage of the Zone 4 assemblage than in the other analytic zones, reflecting use of less extensively modified tools. All of these factors suggest different activities during the earliest occupation of 45-DO-214.

Table 3-6. Zone frequencies of artifacts of other lithic material sorted by formal category, 45-DO-214.

Object Type	Material	Zone				Total
		1	2	3	4	
Formed Objects						
Biface	indeterminate	1	2	1	1	5
Tabular knife	granite	–	1	–	–	1
	indeterminate	–	1	–	1	2
Adze	nephrite	–	–	1	1	2
Pipe	steatite	–	1	1	–	2
	indeterminate	–	–	1	–	1
Stone bead	nephrite	–	1	–	–	1
	indeterminate	1	1	–	1	3
Hammerstone	granite	–	2	–	2	4
	indeterminate	–	1	1	–	2
Anvil	granite	1	–	–	–	1
Abrader	sandstone	–	1	8	–	9
Subtotal		3	11	13	6	33
Modified/Worn/Specialzed Flakes						
Bifacially retouched flake	indeterminate	–	–	1	1	2
Utilized flake	indeterminate	–	2	1	–	3
Indeterminate	silt/mudstone	–	2	–	10	12
	indeterminate	–	1	1	2	4
Subtotal		–	5	3	13	21
TOTAL		3	16	16	19	54

FUNCTIONAL ANALYSIS

The functional analysis of lithic artifacts from 45-DO-214 provides basic descriptive information on broad categories of characteristics and modifications associated with manufacture and use. Manufacture-specific dimensions include indications of utilization/modification, the type of manufacture and the disposition of the manufacture. Seven dimensions are specific to each worn area on an object: condition of wear, the wear/manufacture relationship, the kind of wear, the location of wear on the object, the shape of the worn area, the orientation of the wear and the edge angle at the worn location. The variables of the dimensions are presented in Appendix B, Table 11.

It may prove helpful to summarize briefly the pattern of use that characterizes most artifacts. The tool user selects a lithic object according to the nature of the task at hand and the availability of the appropriate or adequate tool. The task demands that the tool possess certain attributes--these may inhere naturally to the tool, or require its modification. Use of the tool may destroy these attributes resulting in its discard or its remodification to extend its useful life. A single object may serve several functions during the period it remains in use.

Various investigators have documented and described complexes of wear attrition and edge angle associated with specific functions both ethnographically and experimentally (e.g., Frison 1968; Wilmsen 1970; Gould et al. 1971; Gould and Quilter 1972; Hayden and Kamminga 1973; Wylie 1975). While it would be difficult to correlate the present analysis directly with the observations in the literature, because of differences in methodology and quantification, some indication of general functions may be derived from this data. Table 3-7 presents general correlations between variables of wear and implied functions.

Table 3-7. Variables of wear and implied functions[1], 45-DO-214.

General Activity	Specific Function	Materials Modified	Associated Edge Angle (degrees)	Typical Wear Traces
Scraping	Soft Scraping	Hide	50-80	Smoothing; edge and unifacial
	Hard Scraping	Wood, Bone	70-90	Hinged and feathered chipping, smoothing; edge and unifacial
Cutting	Carving	Hide, Flesh Wood	30-60	Feathered chipping and smoothing; bifacial
	Sawing	Wood, Bone	20-70	
Percussion	Chopping	Wood, Bone	60-90	Hinged chipping and crushing; edge and bifacial
	Pounding	Wood, Bone Stone, Shell	N/A	Crushing, pecking; surface
Penetration	Drilling	Wood, Bone Stone, Shell	N/A	Hinged and feathered chipping, smoothing; opposing unifacial and point
	Awling	Hide	N/A	Feathered chipping, smoothing; bifacial and point
	Projectile Impact	Hide, Bone Soil, Stone	N/A	Tip burination, striations, hinge fracture

[1] Adapted from Wylie 1975:Figure 2, Figure 19.

The kinds, locations and intensity of wear traces depend on the mode of use, the material of the tool, the character of the edge, the nature of the material worked and the presence of abrasive agents (Hayden and Kamminga 1973:6). These traces are not directly comparable to each other nor can they be regarded as quantifications of activities because differing amounts and kinds of attrition result from the use of different materials, tool forms and functional activities (Wylie 1975). A host of factors complicates their detection and interpretation--weathering, manufacturing and rejuvenating practices, multiple use for differing tasks, recovery processes, and post recovery accidents.

Just as no single wear variable is clear evidence of function, neither is edge angle alone diagnostic of a particular task. The shear and tensile strength of the tool material in relation to the force and angle of application, the artifact form, and the hardness of the material being worked are also key factors. The optimal tool edge angle is "a compromise between worked material hardness and the ability of the tool to withstand stress" (Wilmsen 1974:91). Cryptocrystallines, for example, are stronger in compression than in shear or tensile strengths. This means that forces exerted into the body of the tool are absorbed without damage if the tool is thick enough at the point of force application to transmit the developed stresses. Thus, very acute angles probably were seldom used because of the fragility of such an edge. Edges with mid-range angles can transmit forces directly into the body of the tool without excessive damage, but break easily under transversely applied loads. More obtuse angles are able to absorb shear stresses as well as compression (Wilmsen 1974:92).

The level of analysis also influences the strength of functional interpretation. Because this analysis is based on macroscopic evidence of use, functional traces probably are underrepresented. For example, the position of striae is very useful in determining an artifact's use; however, they usually require microscopic analysis for detection. This level of examination was not feasible in a project of this size, and two studies have suggested that use of higher magnification results in little additional new information (Stafford and Stafford 1979; Holley 1979).

Although the functional analysis presented here cannot exhaustively identify or quantify the activities which took place at 45-DO-214, it does provide a general indication of the kinds of tasks undertaken by the occupants. When applied to the traditional descriptive artifact categories, functional analysis can also refine the classification and the interpretation of actual use.

The following discussion provides a general description of the lithic assemblage based on the dimensions of the functional analysis. The subsequent section applies the analysis directly to the formal artifact categories.

Over 91 percent of the lithic assemblage from 45-DO-214 is unmodified debitage from manufacturing processes. The remaining items are almost equally divided between worn artifacts and items showing evidence of manufacture only and wear and manufacture. These proportions vary little among the analytic zones (Figure 3-7). Except for four instances of grinding and one of grinding and pecking, manufacture is limited to chipping. The chipping most often

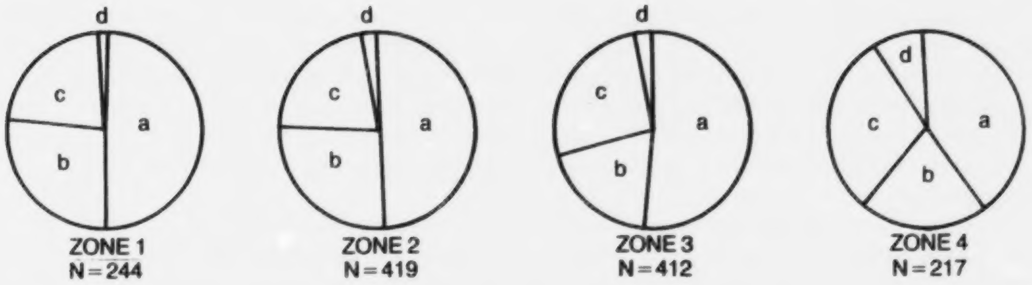


Figure 3-7. Utilization/modification by zone, 45-DO-214; a = wear only, b = manufacture only, c = wear and manufacture, d = indeterminate.

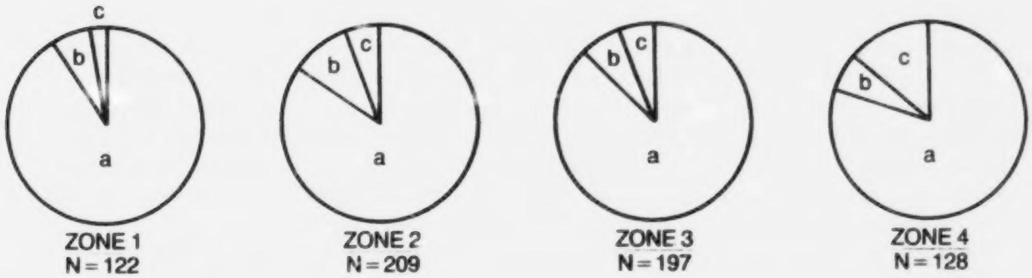


Figure 3-8. Manufacture disposition by zone, 45-DO-214; a = partial, b = total, c = indeterminate.

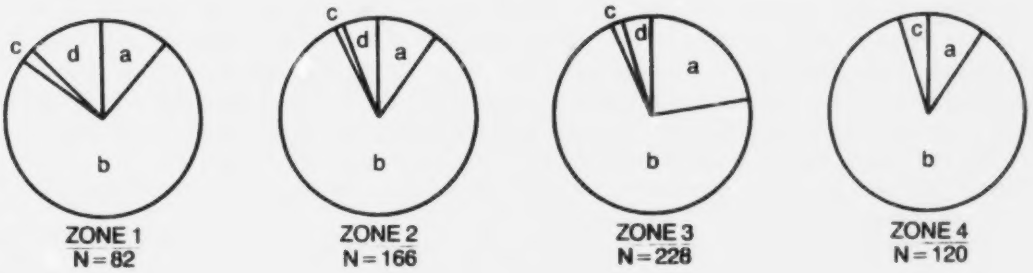


Figure 3-9. Wear/manufacture relationship by zone, 45-DO-214; a = independent, b = total overlap, c = partial overlap, d = independent-opposite; does not include 3 indeterminate.

partially modifies the artifact (Figure 3-8). When wear occurs on a modified artifact it most often totally or partially overlaps the modification (Figure 3-9). There is a small percentage of artifacts, including unifacially retouched flakes (65.5%), bifacially retouched flakes (12.5%), utilized flakes (6.3%), resharpening flakes (6.3%), linear flakes (6.3%), gravers (9.3%), a scraper and a spokeshave, with wear occurring opposite the modification suggesting tool backing.

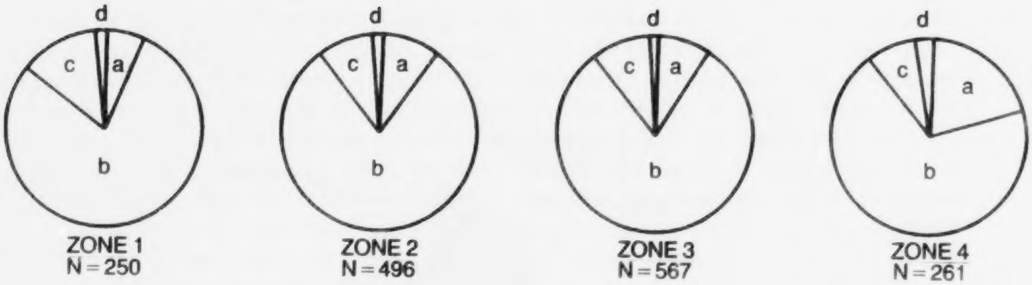
In the original analysis there were 17 separate categories of kinds of wear (Appendix B, Table 11). Eight of these were recorded for the 45-DO-214 assemblage. In the subsequent discussion, several of these eight have been combined to produce larger sample sizes and to reduce minimal distinctions (Appendix B, Table 12): smoothing now includes abrasion, polishing, and smoothing in combination with hinged or feathered chipping. Similarly, all locations of wear involving points were combined into a single group. Two categories representing convex and concave worn areas were also formed.

Feathered chipping is by far the most common kind of wear. Smoothing and hinged chipping occur with similar relative frequencies while crushing/pecking composes only a small amount of the wear recorded (Figure 3-10). Hinged and feathered chipping occur primarily unifacially on convex or straight locations. They occur less frequently bifacially and on concave edges or points. Smoothing is somewhat more widely distributed, occurring primarily on convex edges or unifacially on convex locations and to a lesser degree on points and concave locations. Crushing/pecking is almost entirely limited to convex edges and terminal surfaces (Figures 3-11 and 3-12).

Most of the wear is oriented perpendicular to the edge. Less than 1% of the wear has oblique or diffuse orientation. The condition of the wear, that is, the complete or fragmentary state of the wear location and its complex of variables, was also recorded. Over 80% of the wear locations were determined to be complete. Neither of these dimensions vary markedly among the zones.

Edge angle, when examined in association with the kind of wear, shows modal tendencies (Figure 3-13). Smoothing is accompanied by edge angles ranging from 11 to 90 degrees but most commonly occurs on edges with angles between 31 and 50 degrees. Hinged chipping occurs with angles ranging from 11 to 90 degrees with a mode at 41 to 50 degrees and a lesser mode from 61 to 80 degrees. In contrast to smoothing and hinged chipping, feathered chipping is associated with more acute angles with a mode at 11 to 20 degrees and a range of 1 to 90 degrees. Most of the crushing/pecking is located on a surface so that the edge and its angle are of little importance to function. Crushing/pecking does appear in small frequencies on edges in the 11 to 20 degree range and the 90 to 95 degree range.

This data gives us a general indication of the complexes of wear variables occurring in the assemblage. Comparing it to Table 3-7, we find evidence for most of the functions and materials, suggesting diversified activities at the site rather than limited, specialized ones. We can further explore this diversity as well as the significance of our classification by examining the wear complexes in relation to the formal artifact types and their definitions.



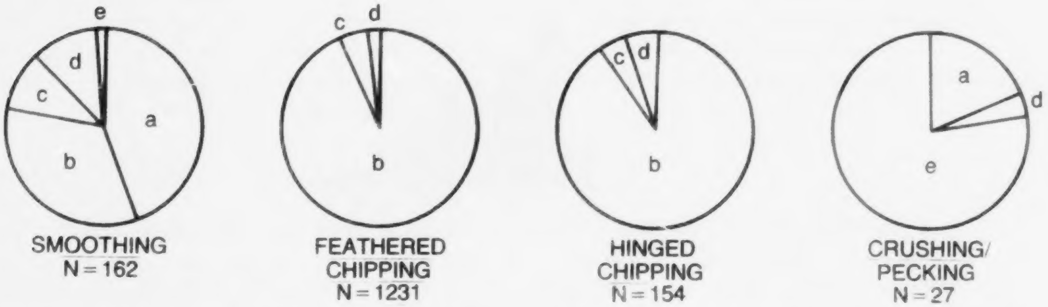
ZONE 1
N = 250

ZONE 2
N = 496

ZONE 3
N = 567

ZONE 4
N = 261

Figure 3-10. Kinds of wear by zone, 45-DO-214; a = smoothing, b = feathered chipping, c = hinged chipping, d = crushing/pecking.



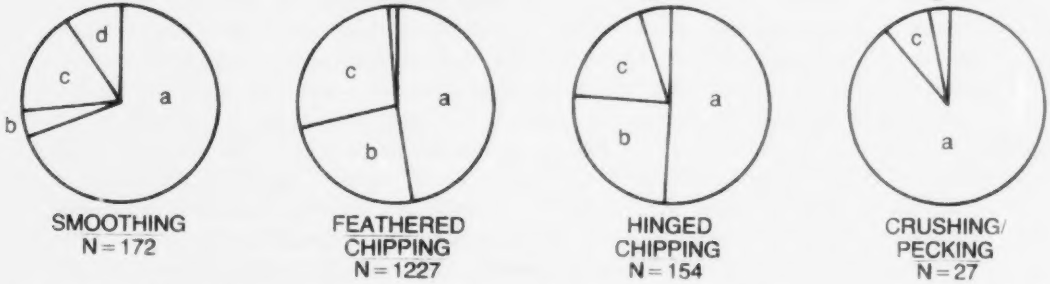
SMOOTHING
N = 162

FEATHERED
CHIPPING
N = 1231

HINGED
CHIPPING
N = 154

CRUSHING/
PECKING
N = 27

Figure 3-11. Locations of kinds of wear, 45-DO-214; a = edge, b = unifacial, c = bifacial, d = point, e = surface.



SMOOTHING
N = 172

FEATHERED
CHIPPING
N = 1227

HINGED
CHIPPING
N = 154

CRUSHING/
PECKING
N = 27

Figure 3-12. Shapes of worn areas associated with kinds of wear, 45-DO-214; a = convex, b = concave, c = straight, d = point. Does not include irregularly shaped areas, N = 4.

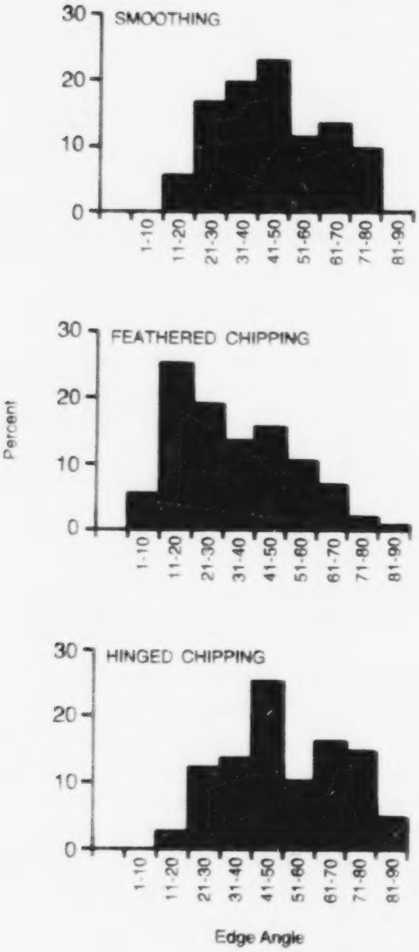


Figure 3-13. Edge angles associated with kinds of wear, 45-DO-214.

Table 3-8 presents the ratio of wear locations to the number of objects. This figure indicates the degree of use of a category of objects but does not imply function. For example, bifaces, considered technological precursors rather than end products, show a relatively low ratio in comparison to utilized flakes which are defined by the presence of use-modification. Other categories with relatively high ratios include unifacially retouched flakes, and tabular knives. Projectile points, usually considered single function tools, also have a relatively low ratio. The ratio on bifacially retouched flakes is average. The ratio is not a sensitive indicator when frequencies within a category are small. Consider, for example, the single maul with four wear locations.

Each formal type will be discussed briefly in terms of its definition and the complexes of wear dimensions which occur in the category. Table 3-9 presents a tabulation of edge angles for formed objects in relation to the kinds and locations of wear. Complexes with angles greater than 90 degrees have been excluded from this tabulation. Reference may be made to Tables 3-10, and 3-11 through 3-20 for kinds of wear, locations of wear and shape of the worn location, sorted by object type and by zone. Illustrations of typical artifacts accompany the discussion (Plates 3-1 through 3-4 and Figures 3-14, 3-15, 3-16, 3-21 through 3-25).

PROJECTILE POINTS

These artifacts will be more thoroughly examined in the subsequent stylistic section and are illustrated in Plate 3-4. Generally, they are bifacially flaked, axially symmetrical, lenticular to planoconvex in cross section, triangular to leaf shaped in plan section, with basal modification for hafting to an arrow or dart shaft.

All of the objects in this category may not have been intended for use as projectile points. We were able to identify two groups of artifacts in the stylistic analysis lacking basal modification. The first is a group of finely finished, large, triangular forms that seem more appropriately termed "knives" (Plate 3-4; cc through ee). The second group consists of small, triangular forms also lacking basal modification (Plate 3-4; z through bb) representing the preform stage in the previously discussed bifacial reduction sequence.

Wear in this category is not restricted to the tip of the artifacts as might be expected, although over 20 percent of the wear damage occurs on points (Table 3-10). The most common complex is feathered, unifacial chipping on a convex or straight location followed in frequency by bifacial, feathered chipping on the same shaped locations. Some of the wear traces probably represent manufacture or hafting modifications rather than wear. The wear variable complexes and edge angles primarily from 31-60 degrees, however, suggest use for cutting and light scraping as well as piercing.

Breakage location and orientation was recorded for 58 of the 81 classifiable projectile points (Table 3-11). The most common location of breakage is the blade and the most common orientation is perpendicular to the long axis of the projectile point. Most often, the blades or tips of these artifacts are snapped perpendicularly. Less frequent are multiple breakages

Table 3-8. Number of objects, number of locations of wear, ratio number of locations, number of objects, 45-DO-214.

Object Type	ZONE 1			ZONE 2			ZONE 3			ZONE 4			TOTAL		
	OBJ	LOCS	L/O	OBJ	LOCS	L/O	OBJ	LOCS	L/O	OBJ	LOCS	L/O	OBJ	LOCS	L/O
Projectile point[1]	34	18	0.53	39	16	0.41	34	16	0.47	13	7	0.54	120	57	0.48
Biface	31	7	0.23	69	25	0.36	54	38	0.70	23	17	0.74	177	87	0.49
Drill	0	0	–	3	4	1.33	0	0	–	1	1	1.00	4	5	1.25
Graver	2	3	1.50	3	10	3.33	2	7	3.50	0	0	–	7	20	2.86
Scraper	0	0	–	7	20	2.86	8	29	3.63	0	0	–	15	49	3.27
Spokeshave	1	3	3.00	0	0	–	0	0	–	0	0	–	1	3	3.00
Tabular knife	6	3	0.50	14	22	1.57	11	14	1.27	32	41	1.28	63	80	1.27
Adze	0	0	–	0	0	–	1	0	–	1	1	1.00	2	1	0.50
Maul	0	0	–	0	0	–	1	4	4.00	0	0	–	1	4	4.00
Chopper	1	1	1.00	0	0	–	1	1	1.00	2	5	2.50	4	7	1.75
Hammer	0	0	–	3	5	1.67	1	2	2.00	4	9	2.00	8	15	1.88
Anvil	1	2	2.00	1	2	2.00	0	0	–	0	0	–	2	4	2.00
Peripherally flaked cobble	1	1	1.00	0	0	–	0	0	–	3	0	–	4	1	0.25
Core	0	0	–	2	3	1.50	5	6	1.20	4	0	–	11	9	0.82
Utilized flake	116	159	1.37	202	131	1.55	209	333	1.60	86	138	1.61	613	943	1.54
Unifacially retouched flake	15	22	1.47	30	48	1.60	39	78	2.00	21	28	1.33	105	176	1.68
Bifacially retouched flake	20	16	0.80	21	18	0.86	18	20	1.11	9	8	0.89	68	62	0.91
Resharpening flake	7	6	0.86	12	5	0.42	10	7	0.70	3	4	1.33	32	22	0.69
Linear flake	8	6	0.75	4	5	1.25	5	8	1.60	6	3	0.50	23	23	1.00
Indeterminate	2	1	0.50	7	0	–	5	2	0.40	16	0	–	30	3	0.10

[1] Includes projectile point tips, bases, whole points.

Table 3-9. Edge angles for formed objects in relation to the kinds and locations of wear, 45-DO-214.

Formed Object Type	Kind/Location of Wear:	N/A	Smoothed Edge			Smoothed Bifacial			Hinged Bifacial			Feathered Bifacial			Smoothed Unifacial			Hinged Unifacial			Feathered Unifacial			TOTAL					
	Edge Angle[1]:	N/A	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1		2		3	
																								N	Row %	N	Row %	N	Row %
Projectile points		8									1	2	1	1		2		2	2	1	1	16	1	5	16.7	21	70.0	4	13.3
Base							1												1		2	3		2	28.6	5	71.4	–	
Tip		1								2			1						4		1	3		1	9.1	10	90.9	–	
Biface		4		1			2		1		1	1	3	1		1	1		7	3	7	44	10	9	10.8	58	69.9	16	19.3
Drill		3																	1			1		–		2	100.0	–	
Graver		3										1		1		2			2	3	3	3	2	4	23.5	7	41.2	6	35.3
Scraper		2		1										1	1	9	5	1	5	5	3	13	3	5	10.6	28	59.6	14	29.8
Spokeshave																				1			2	–		–		3	100.0
Tabular knife			34	25	11		1	1								5	3							34	42.5	31	38.8	15	18.7
Core		1												1								5	2	–		5	62.5	3	37.5
Utilized flake		14				1		1	1	2		17	17		7	4	1	2	31	10	511	257	57	548	59.1	311	33.5	69	7.4
Unifacially retouched flake		4										3	8		2	7	4	3	11	21	25	59	29	33	19.2	85	49.4	54	31.4
Bifacially retouched flake		1					1	2	1			3	1						3	2	12	28	8	16	26.2	33	54.1	12	19.7
Resharpening flake													1					1	2	3	4	9	2	5	22.7	12	54.5	5	22.7
Linear flake																			1		15	6	1	15	65.2	7	30.4	1	4.4
COLUMN TOTAL		41	34	27	11	1	5	4	3	4	2	27	33	5	10	30	14	9	70	49	584	448	117	678		615		202	

[1] Edge angle codes.
1 = 1 - 30 degrees
2 = 31 - 60 degrees
3 = 61 - 90 degrees

Table 3-10. Wear complexes; projectile points, bases, and tips, 45-DO-214.

Kind of wear (% Total)	Location of wear (% Total)	Shape of worn area (% Total)	Zone				Total
			1	2	3	4	
Smoothed (10.9)	Unifacial (1.8)	Convex (1.60	1^+				1^+
	Bifacial (3.8)	Straight (3.8)		2			2
	Point (5.3)	Point (5.3)	2	1			3
Feathered (61.4)	Unifacial (47.3)	Convex (22.8)	2^*	$1/1^+$	$3/2^+$	4	$8/3^+/2^*$
		Concave (7.0)		$3/1^*$			$3/1^*$
		Straight (17.5)	1^*	4	$2/2^+$	1	$7/2^+/1^*$
	Bifacial (8.8)	Convex (1.8)			1		1
		Straight (7.0)	2	1^*		1	$3/1^*$
	Point (5.3)	Point (5.3)	1		1	1	3
Hinged (24.5)	Unifacial (17.5)	Convex (7.0)	$2/2^*$				$2/2^*$
		Convave (1.8)			1^+		1^+
		Straight (8.8)		1	$1/2^*$		$3/2^*$
	Bifacial (3.5)	Convex (3.5)	1	1^*			$1/1^*$
	Point (3.5)	Point (3.5)	1		1		2
Crushed (3.5)	Point (3.5)	Point (3.5)	1^*		1		$1/1^*$
TOTAL			18	16	16	7	57

* tip
+ base

and parallel and diagonal snapping of the blade above the hafting element. It is difficult to determine what proportion of the breakage may be due to impact. The parallel and diagonal breakage suggests force applied to the long axis of the flake as would be expected from impact, either with an animal or the ground. The perpendicular breakage suggests the application of force laterally to the point. This is not the kind of breakage we would expect to occur from impact and may indicate multiple function for the artifacts. Some of the damage may also have occurred during manufacture. The fact that breakage occurs primarily above the base suggests the artifacts were hafted, leaving the blade most susceptible to damage. This is supported by the data from the identifiable projectile points and by the recovery of more tips than bases. The lower frequency of bases may also reflect the practice of modifying them for reuse after tips or blades were broken.

Table 3-11. Projectile point breakage location and kind by zone, 45-DO-214.

Location and Kind	Zone				Total
	1	2	3	4	
Distal 1/3					
Perpendicular	4	2	4	2	12
Diagonal	1	–	2	1	4
Multiple	–	1	–	–	1
Reworked	–	–	1	–	1
Barbed or Shouldered					
Diagonal	5	–	3	–	8
Parallel	–	–	–	1	1
Reworked	–	1	–	1	2
Mid-Blade					
Perpendicular	2	1	1	–	4
Diagonal	–	1	1	–	2
Parallel	–	–	–	1	1
Multiple	1	1	1	–	3
Reworked	1	1	–	–	1
Proximal 1/3					
Diagonal	3	6	1	1	11
Multiple	1	–	–	1	2
N/A					
Diagonal	–	4	2	–	6
Parallel	–	2	–	–	2
Reworked	1	1	–	1	3
Reworked	3	5	4	–	12
Total	21	26	20	9	76
Ratio # Locations: # Broken Points	1.31	1.30	1.33	1.29	

The frequency of breakage among the zones reflects the sample sizes. Looking forward to the stylistic analysis, we find the first three zones to be dominated by small, comparatively delicate corner-notched, side-notched and stemmed forms (Table 3-21). Zone 4 yielded larger, more robust lanceolate and stemmed forms. Zone 4 shows the lowest ratio of breakage locations to number of broken points and Zone 3 the highest (Table 3-11). The small corner-notched and stemmed forms show more breakage of the barb/shoulder, but generally the pattern of diagonal breakage of the blade continues (Appendix B, Table 13).

The breakage analysis was only applied to projectile points complete enough to be considered for stylistic analysis. It does not take into account other tips, bases, midsections, or possible projectile point fragments included in the biface category.

PROJECTILE POINT TIPS

These objects are broken above the base and so lack the diagnostic hafting element of the complete projectile point. They are distinguished from biface fragments by their relatively slighter width and small, more refined flake scars.

Only one of the artifacts is recorded as showing tip damage (Table 3-10). Just as for the complete projectile points, the primary wear damage is feathered, unifacial chipping on convex and straight edges. Single examples of hinged chipping and smoothing also occur. Wear suggests use for cutting and light scraping.

PROJECTILE POINT BASES

These artifacts retain the characteristic hafting element of the projectile point, but lack the blade. In contrast to the complete points and the tips, unifacial, hinged chipping on convex and concave segments is most frequent (Table 3-10). Similar chipping also occurs on two points. Unifacial, feathered chipping on convex, concave and straight edges is secondary. Crushing of a projection and bifacial feathered chipping of a straight edge also occur. Such wear damage again may be due to manufacture, but it may also be a result of hafting, especially on concave, notched locations. Hinged chipping also may be evidence of the dulling of edges to allow attachment to a shaft. Other functions suggested by the wear complexes are post-breakage use for scraping and cutting.

BIFACES

This kind of artifact has been previously mentioned in the discussion of the lithic reduction sequence. The objects, generally made on flakes, are usually thin, lenticular in cross section and ovate, subtriangular or leaf-shaped in plan view (Plate 3-1;a,b). They are distinguished from projectile points by lack of basal modification, broader width and less refined, larger, unpatterned or collateral flake scars. In general, they are very fragmentary. Several larger specimens have obvious material flaws which prevented their continued reduction and resulted in discard. Included in this category are numerous bifacially worked fragments which are pieces of other kinds of bifacially formed tools.

Feathered, unifacial chipping on convex and straight edges and, to a lesser extent, on concave edges is the primary wear complex recorded (Table 3-12). The wear complexes and widely distributed edge angles suggest primarily scraping and cutting activities as well as drilling. Although platform preparation of edges for further flake detachment would be expected to affect the frequencies of wear on the edge itself, only a single edge location with smoothing was recorded. The inclusion of bifacial tool fragments carrying traces associated with a variety of functions influences the diversity of kinds and position of wear recorded. Use of fragments with projections for drilling, piercing and engraving also occurred.

Table 3-12. Wear complexes; bifaces, 45-DO-214.

Kind of wear [% Total]	Location of wear [% Total]	Shape of worn area [% Total]	Zone				Total
			1	2	3	4	
Smoothed [9.1]	Edge [1.1]	Convex [1.1]			1		1
	Unifacial [2.3]	Convex [2.3]		1	1		2
	Bifacial [2.3]	Convex [2.3]			1	1	2
	Point [3.4]	Point [3.4]	2	1			3
Feathered [76.1]	Unifacial [69.3]	Convex [36.4]	1	6	21	4	32
		Concave [12.5]	1	4	1	5	11
		Straight [20.4]	2	3	9	4	18
	Bifacial [5.7]	Convex [5.7]	1	2	2		5
	Point [1.1]	Point [1.1]			1		1
Hinged [14.8]	Unifacial [11.4	Convex [8.0]	1	3	1	2	7
		Concave [2.3]		2			2
		Straight [1.1]		1			1
	Bifacial [2.3]	Straight [2.3]		1		1	2
	Point [1.1]	Point [1.1]		1			1
TOTAL			8	25	38	17	88

DRILLS

Objects in this category include artifacts completely bifacially modified to form a thin tip and bifacially modified projections on flakes (Plate 3-1;h,i). Recorded wear damage includes unifacial hinged and feathered chipping on concave locations and smoothing and feathered chipping of points (Table 3-13). The feathered and hinged chipping suggests damage from or modification for hafting because it occurs on concave locations. The point damage suggests use for piercing rather than the rotary movement associated with drilling.

KEY
Master Number:
Tool:
Provenience/Level:
Zone:
Material:

a.
1333
Biface
63N12E/140
4
CCS

b.
1308
Biface
64N12E/140
4
CCS

c.
1283
Core
63N12E/100
4
CCS

d.
1282
Core
59N14E/80
4
CCS

e.
1491
Scraper
48N27E/130
3
CCS

f.
575
Scraper
46N28E/90
2
CCS

g.
1522
Scraper
50N26E/110
3
CCS

h.
114
Drill
48N24E/70
2
CCS

i.
406
Drill
43N28E/70
2
CCS

j.
984
Scraper
52N27E/80
2
CCS

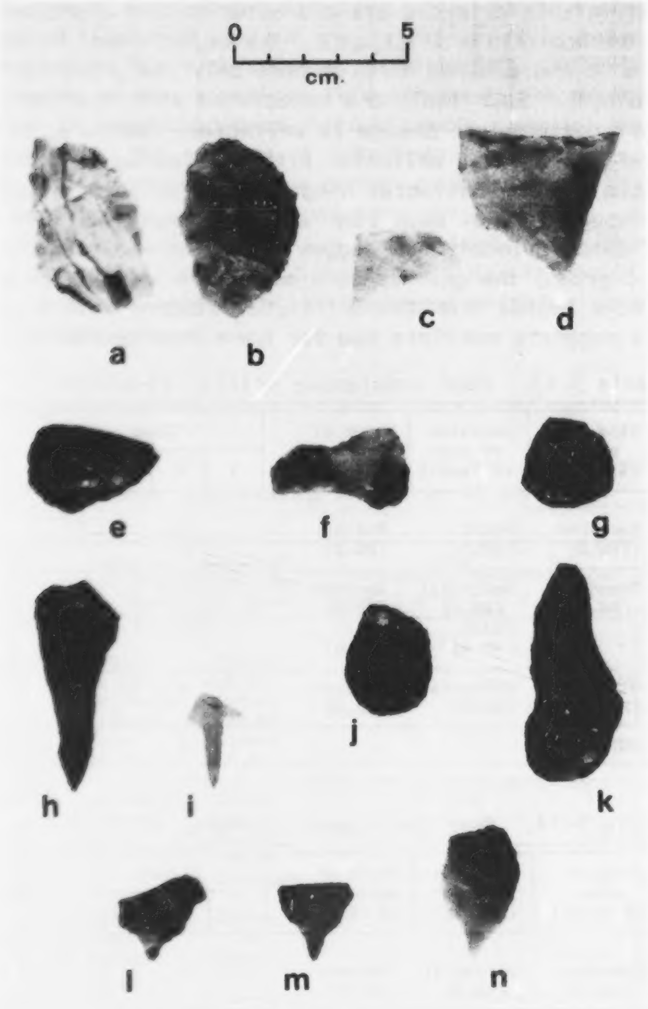
k.
998
Scraper
52N27E/120
3
CCS

l.
471
Graver
46N27E/80
2
CCS

m.
630
Graver
45N29E/110
3
CCS

n.
618
Graver
45N29E/60
1
CCS

Plate 3-1. Examples of gravers, scrapers, drills, cores and bifaces, 45-DO-214.


0
5
cm.
a
b
c
d
e
f
g
h
i
j
k
l
m
n

GRAVERS

Artifacts in this category are characterized by a projecting tip shaped by unifacial retouch (Plate 3-1;l,m,n). The objects may be entirely modified by manufacture to the desired form or have only the graver bit showing intentional retouch. Such tools are associated with the incising of wood and bone. The most common wear damage is unifacial, feathered chipping on a convex or straight edge and unifacial hinged chipping on convex or concave locations (Table 3-14). Unifacial hinge damage on points suggests graving activities although more of such wear would be expected. The other damage, especially of concave locations, suggests hafting and perhaps light scraping activity. As a group, the gravers show much more use damage and wider variation of edge angles than the drills, a category with a similar number of objects. This suggests multiple use for more than one activity.

Table 3-13. Wear complexes; drills, 45-DO-214.

Kind of wear (% Total)	Location of wear (% Total)	Shape of worn area (% Total)	Zone				Total
			1	2	3	4	
Smoothed (20.0)	Point (20.0)	Point (20.0)		1			1
Feathered (60.0)	Unifacial (20.0)	Concave (20.0)		1			1
	Point (40.0)	Point (40.0)		1		1	2
Hinged (20.0)	Unifacial (20.0)	Concave (20.0)		1			1
TOTAL				4		1	5

Table 3-14. Wear complexes; gravers, 45-DO-214.

Kind of wear (% Total)	Location of wear (% Total)	Shape of worn area (% Total)	Zone				Total
			1	2	3	4	
Smoothed (10.0)	Unifacial (10.0)	Concave (10.0)		2			2
Feathered (50.0)	Unifacial (40.0)	Convex (20.0)	1	1	2		4
		Straight (20.0)		4			4
	Bifacial (10.0)	Convex (10.0)		2			2
Hinged (40.0)	Unifacial (25.0)	Convex (10.0)			2		2
		Concave (15.0)			3		3
	Point (15.0)	Point (15.0)	2	1			3
TOTAL			3	10	7	0	20

SCRAPERS

This group has been defined as flakes with steep unifacial intentional retouch forming a convex edge (Plate 3-1;e,f,g,j,k). To be a scraper, the shape of the original flake and most of one surface must be altered through modification. The wear on these objects is predominantly unifacial (Table 3-15). Though the number of use locations in relation to the number of objects is large, the number of wear complexes (kind of wear, location of wear, shape of worn area) relative to the numbers of locations is relatively low. The primary wear is unifacial smoothing on a convex edge followed in frequency by unifacial feathered chipping on convex and straight locations. The unifacial smoothing and feathered chipping and, to a less extent, the hinged chipping, reflect soft scraping activities. The hinged chipping, traces of wear on points and concave surfaces, and bifacial feathered chipping suggest hafting and additional secondary use.

Table 3-15. Wear complexes; scrapers, 45-DO-214.

Kind of wear (% Total)	Location of wear (% Total)	Shape of worn area (% Total)	Zone				Total
			1	2	3	4	
Smoothed (34.6)	Edge (2.0)	Convex (2.0)		1			1
	Unifacial (30.6)	Convex (30.6)		6	9		15
	Point (2.0)	Convex (2.0)			1		1
Feathered (44.9)	Unifacial (40.9)	Convex (28.6)		5	9		14
		Concave (8.2)		2	2		4
		Straight (4.1)		1	1		2
	Bifacial (2.0)	Convex (2.0)		1			1
	Point (2.0)	Point (2.0)			1		1
Hinged (20.4)	Unifacial (20.4)	Convex (14.3)		2	5		7
		Concave (4.1)		2			2
		Straight (2.0)			1		1
TOTAL				20	29		49

SPOKESHAVES

These artifacts have deeply concave segments of flake edges formed by unidirectional use or intentional retouch. Their surmised function is the shaping and smoothing of wood or bone implements. The wear damage recorded for the single item from the 45-DO-214 collection exhibits unifacial feathered chipping on a straight location and hinged chipping on a concave location, as would be expected from the artifact definition.

TABULAR KNIVES

The artifacts in this category are thin slabs with unifacial or bifacial modification of edges. They are generally bi-planar in cross-section and range from somewhat irregular outline to ovate, circular and rectangular forms (Plate 3-2;a,c,e,). They are manufactured primarily of locally available quartzite which breaks into characteristic thin, laminar pieces. Wear damage is even more uniform in type and edge angles more acute than in the scraper categories. Wear consists primarily of smoothing of convex or straight edges (Table 3-16).

Table 3-16. Wear complexes; tabular knives, 45-DO-214.

Kind of wear [% Total]	Location of wear [% Total]	Shape of worn area [% Total]	Zone				Total
			1	2	3	4	
Smoothed [100.1]	Edge [87.5]	Convex [58.8]	1	13	12	21	47
		Concave [2.5]	1			1	2
		Straight [26.3]	1	3	2	15	21
	Unifacial [10.1]	Convex [8.8]		3		4	7
		Concave [1.3]		1			1
	Bifacial [2.5]	Convex [2.5]		2			2
TOTAL			3	22	14	41	80

These artifacts characteristically exhibit smoothing attrition confined to edges, an attrition so severe that it may obscure the manufacture scars. The pattern of wear suggests that they were used to scrape or cut a soft material, supported on a firm surface. Abrasive agents may have affected the wear. Fish, hides or flesh cut or scraped on the ground, a supporting stone, a plank, or a sandy beach would provide these conditions.

ADZE

The ground stone artifacts in this category are very different in manufacture from the flaked stone artifacts (Figure 3-14). The term adze or celt is traditionally applied to hafted implements used for heavy wood and bone working (Born 1971). Wear recorded for one of the two adzes recovered is bifacial smoothing on a convex edge. Comparison of the bits of the two artifacts showed no appreciable difference in use traces. Rather, both display striations and smoothing from manufacture. Visible striae on the proximal third of the complete adze not recorded in the analysis indicate hafting.

MAUL

This category has been defined as large cobble-derived implements shaped by pecking and sometimes flaking and grinding (Figure 3-15). They are roughly cone or pear-shaped and intended for pounding and crushing activities. The wear damage recorded for the single implement--crushing on convex and concave portions of the terminal surface--coincides with the definition.

CHOPPER

Choppers are manufactured from flat, circular or ovate cobbles by the removal of overlapping unifacial or bifacial flakes to form a sharp edge (Plate 3-2;b). Before dulling, such an edge would be adequate for the disarticulation of a carcass. Four of the seven wear complexes recorded were bifacial smoothing of convex locations. Unifacial smoothing of a convex edge and two crushed edges were also recorded. The percussive chopping activity implied by the term probably could be associated with the crushing and splintering of green bone for marrow extraction. Some investigators (c.f., Flenniken, in Cleveland et al. 1978) believe these implements are initially unifacially flaked and become bifacial in form from battering use. The wear damage supports the implied function.

HAMMERSTONES

Hammerstones are unmodified hand-sized cobbles showing evidence of percussion use (Plate 3-2;f). Presumably they were used in lithic manufacture or for any task requiring pounding. Wear recorded for hammerstones is crushing/pecking of convex terminal surface with the single exception of feathered chipping on a projection. The wear supports the definition.

ANVIL

This category was arbitrarily defined as large flat cobbles with a major convex surface showing evidence of wear. The wear recorded is crushing/pecking of convex surfaces. Anvils served as supports for lithic

KEY
Master Number:
Tool:
Provenience/Level:
Zone:
Material:

a.
1168
Tabular knife
53N7E/90
4
Quartzite

b.
243
Chopper
63N6E/160
4
Quartzite

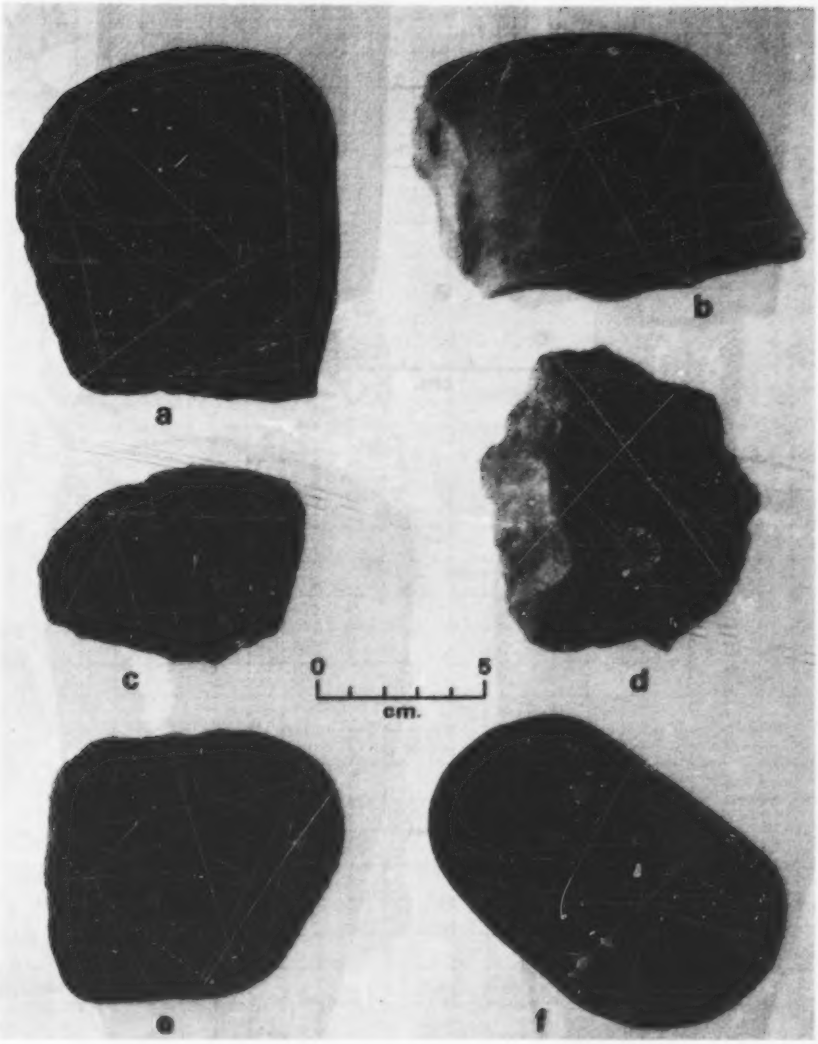
c.
237
Tabular knife
63N6E/70
4
Quartzite

d.
244
Peripherally flaked cobble
63N6E/180
4
Quartzite

e.
1167
Tabular knife
53N7E/90
4
Quartzite

f.
1326
Hammerstone
64N13E/170
4
Basalt

Plate 3-2. Examples of cobble tools, 45-DO-214.


a
b
c
0
5
cm.
d
e
f

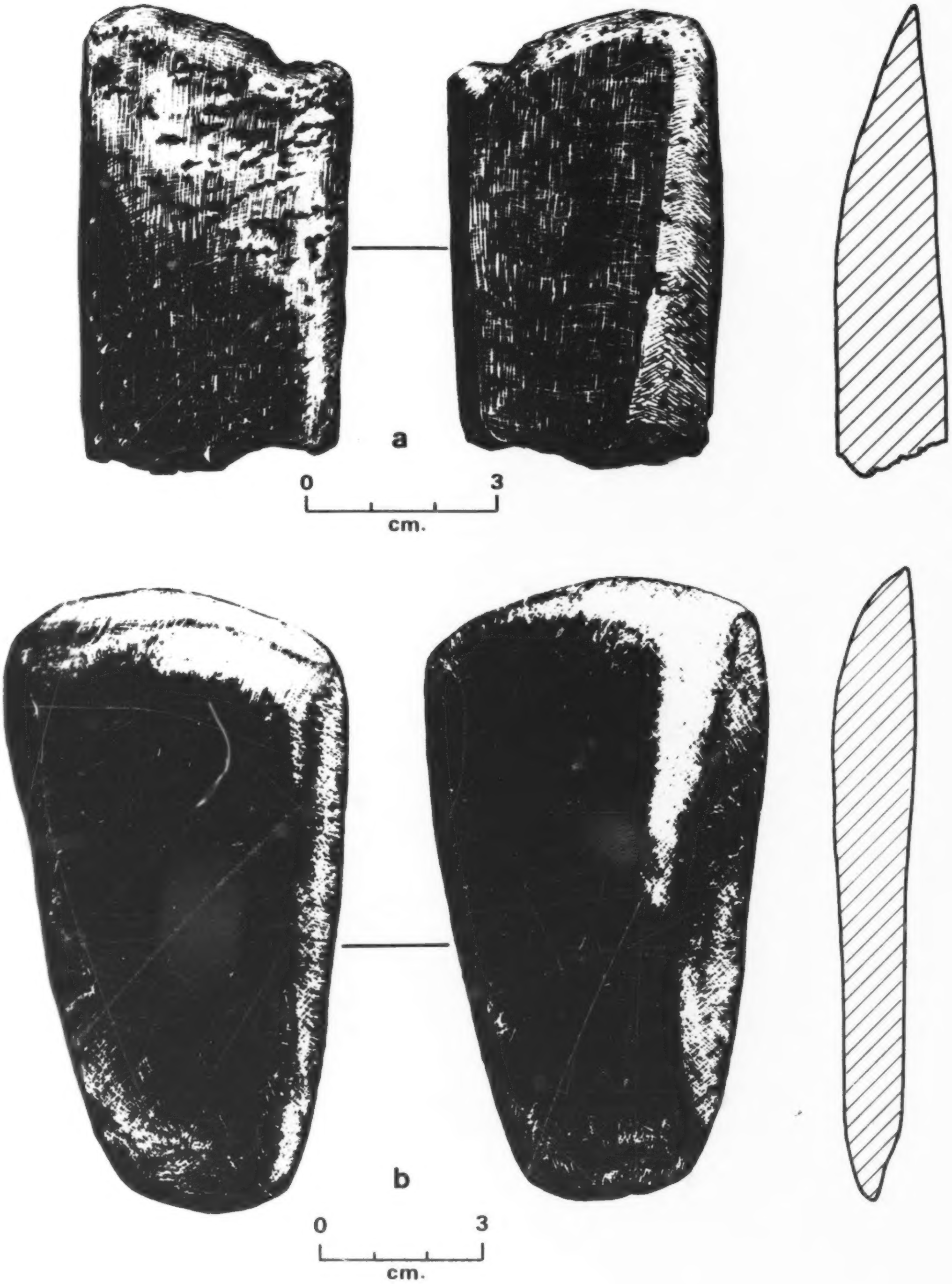

a
0
3
cm.
b
0
3
cm.

Figure 3-14. Nephrite adzes, 45-DO-214.

a. M# 1367 65N5E/110/Zone 4	b. M# 1214 54N28E/130/Zone 3

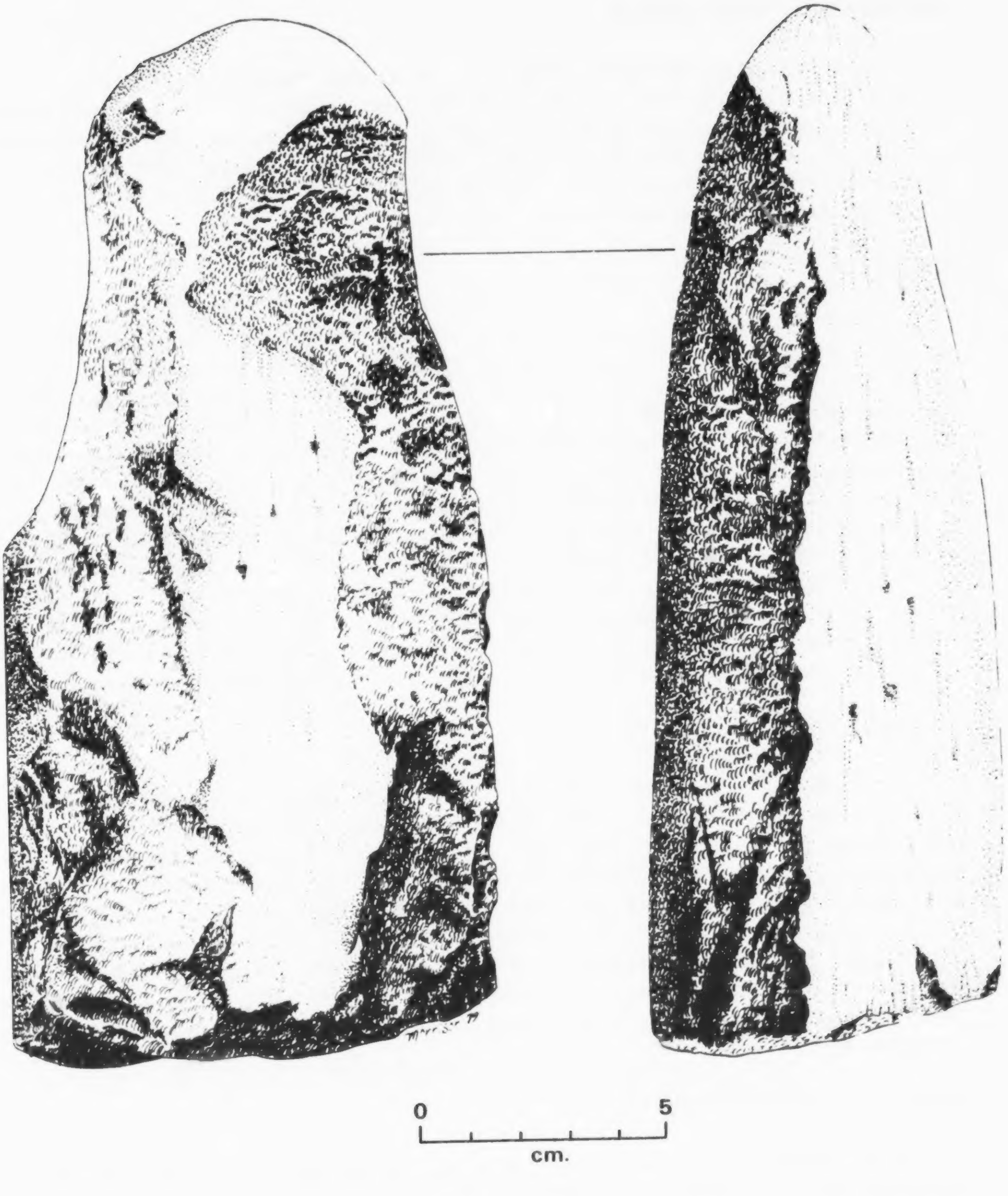


Figure 3-15. Quartzite maul, Feature 13, Zone 3, 45-DO-214, M# 1233/53N28E.

manufacture and food processing. The two anvils show four locations of crushing wear on convex surfaces, supporting the implied use.

PERIPHERALLY FLAKED COBBLES

This category represents cobbles with flakes removed from their circumference (Plate 3-2;d). Only one of four objects in the category shows recorded wear damage--a feather chipped projection--perhaps the consequence of incidental use. The function of the category is not known. The artifacts may represent flaking of cobbles to attain spalls for use; if this is true, they could be described as cores.

CORE

Cores are primarily the source of lithic material for other purposes (Plate 3-1;c,d). They can be diverted from the reduction sequence (Figure 3-1) at any point if an edge or projection is suitable to the task at hand. During classification, an artifact was judged a core if it had a prepared platform with at least two flakes removed from it. As a consequence, numerous small fragmentary lithic pieces with nothing but a platform remnant and truncated flake scars have been classified as cores. Some of the pieces are fragments of large tools such as bifaces where post-breakage flake removal was attempted. Wear damage recorded is unifacial, feathered chipping of three convex, three concave and one straight location. Bifacial feathered chipping of one convex location and smoothing of a projection also occur. All of these traces could have resulted from reductive manufacturing processes. The functional analysis tells us little about additional uses of the category.

UTILIZED FLAKES

This category includes flakes which show evidence of use damage but no sign of intentional modification (Plate 3-3;a,c). It is assumed that flakes may be used for any purpose for which their characteristics are appropriate. While they exhibit various types of wear damage, unifacial feathered chipping of convex and straight locations predominates with a smaller incidence on concave locations (Table 3-17). Hinged chipping is more frequent than smoothing. Undoubtedly, traces from manufacture and accidental damage are included in this tabulation. Edge angles tend to be more acute than among the other categories of specialized flakes. The wear damage suggests cutting and scraping activities.

UNIFACIALLY RETOUCHED FLAKES

This category includes flakes showing intentional unifacial flaking modification of an edge, in order to attain a desired edge form. The greatest frequency of use damage is unifacial feathered chipping of convex, concave, and straight locations. In comparison to the utilized flakes there is proportionately more hinged chipping, smoothing, and more steep edge angles

Table 3-17. Wear complexes; utilized flakes, 45-DO-214.

Kind of wear [% Total]	Location of wear [% Total]	Shape of worn area [% Total]	Zone				Total
			1	2	3	4	
Smoothed [2.0]	Unifacial [1.3]	Convex [1.2]	2	3	6		11
		Concave [0.1]	1				1
	Bificial [0.2]	Straight [0.1]		1			1
		Convex [0.1]		1			1
	Point [0.5]	Point [0.5]	1	2	1	1	5
Feathered [92.0]	Unifacial [87.5]	Convex [40.2]	60	124	143	52	379
		Concave [22.9]	42	65	74	35	216
		Straight [24.1]	40	82	71	34	227
		Irregular [0.3]			2	1	3
	Bifacial [3.6]	Convex [1.9]		10	8		18
		Concave [0.5]		2	2	1	5
		Straight [1.2]	1		6	4	11
	Point [0.1]	Concave [0.1]		1			1
	Point [0.8]	Point	2	2	4		8
Hinged [5.9]	Unifacial [5.6]	Convex [2.5]	4	12	5		24
		Concave [1.9]	4	3	7	4	18
		Straight [1.2]	1	4	3	3	11
	Bifacial [0.3]	Convex [0.1]			1		1
		Straight [0.2]	1	1			2
TOTAL			159	313	333	138	943

KEY
Master Number:
Tool:
Provenience/Level:
Zone:
Material:

a.
750
Utilized flake
48N29E/110
2
CCS

b.
773
Bifacially retouched flake
47N28E/90
2
CCS

c.
748
Utilized flake
48N29E/90
2
CCS

d.
1312
Linear flake
64N12E/150
4
CCS

e.
692
Linear flake
47N27E/30
1
CCS

f.
1394
Linear flake
71N19E/120
4
CCS

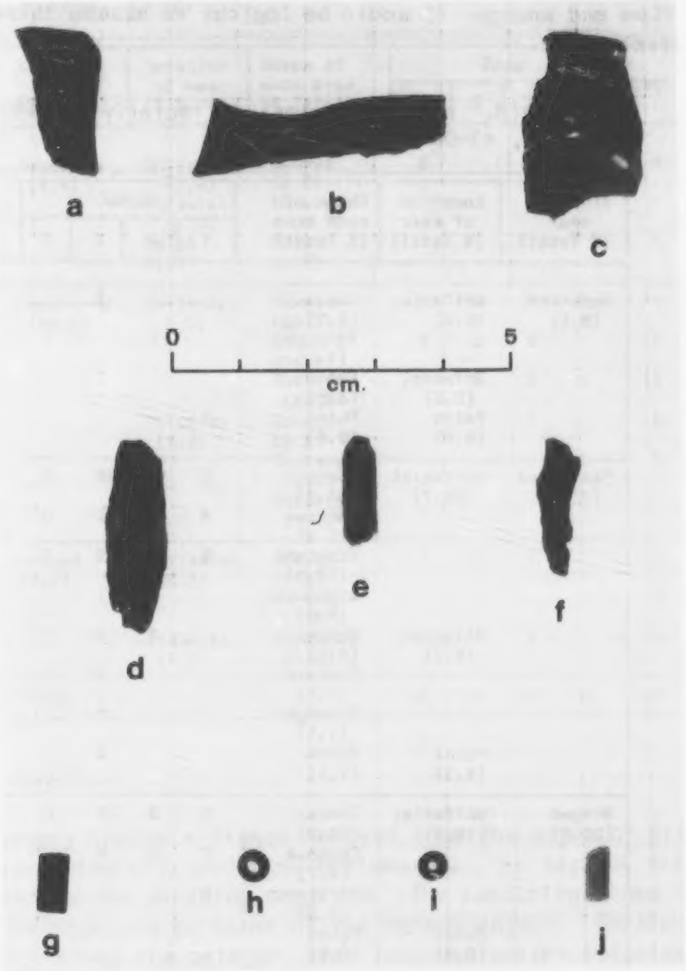
g.
1375
Bead
70N26E/190
4

h.
385
Bead
44N29E/90
2

i.
411
Bead
43N28E/90
2

j.
1243
Dentalium bead
53N29E/120
3

Plate 3-3. Examples of flakes and beads, 45-DO-214.


a
b
c
0
5
cm.
d
e
f
g
h
i
j

(Table 3-18). More unifacially retouched flakes also show bifacial feathered chipping damage. These observations suggest a different emphasis of use, perhaps more cutting activities as evidenced by bifacial damage. More intense scraping use of the items for a longer period of time is suggested by the hinge chipping and smoothing wear. Since modification of the flake required additional time and energy, it would be logical to assume these flakes were more intensively used.

Table 3-18. Wear complexes; unifacially retouched flakes, 45-DO-214.

Kind of wear (% Total)	Location of wear (% Total)	Shape of worn area (% Total)	Zone				Total
			1	2	3	4	
Smoothed (8.0)	Unifacial (6.8)	Convex (5.1)		1	8		9
		Straight (1.7)		2		1	3
	Bifacial (0.6)	Convex (0.6)			1		1
	Point (0.6)	Point (0.6)	1				1
Feathered (71.5)	Unifacial (63.7)	Convex (34.7)	7	18	25	11	61
		Concave (15.9)	4	7	12	5	28
		Straight (12.5)	5	9	5	3	22
		Irregular (0.6)		1			1
	Bifacial (6.7)	Convex (4.5)		3	4	1	8
		Concave (1.1)			2		2
		Straight (1.1)	1		1		2
	Point (1.1)	Point (1.1)			2		2
Hinged (20.5)	Unifacial (19.9)	Convex (11.9)	1	3	11	6	21
		Concave (5.7)	2	2	6		10
		Straight (2.3)	1	1	1	1	4
	Point (0.6)	Point (0.6)		1			1
TOTAL			22	48	78	28	176

BIFACIALLY RETOUCHED FLAKES

These artifacts are similar to the unifacially retouched flakes except for the bifacial modification imposed on them. Again unifacial, feathered chipping of convex, concave and straight locations (associated with median edge angles)is the most frequent wear damage (Table 3-19). Bifacial feathered chipping and smoothing are also found. The significance of the wear damage is probably obscured by bifacial flaking techniques. It is possible that fragments of other bifacially formed tools have been included in this category. The use damage indicates scraping and cutting activities.

Table 3-19. Wear complexes; bifacially retouched flakes, 45-DO-214.

Kind of wear [% Total]	Location of wear [% Total]	Shape of worn area [% Total]	Zone				Total
			1	2	3	4	
Smoothed [6.4]	Unifacial [3.2]	Convex [3.2]	2				2
	Bifacial [1.6]	Straight [1.6]				1	1
	Point [1.6]	Point [1.6]	1				1
Feathered [83.9]	Unifacial [77.5]	Convex [38.7]	5	8	8	3	24
		Concave [14.5]	2	3	4		9
		Straight [24.3]	5	3	5	2	15
	Bifacial [6.4]	Convex [3.2]		1	1		2
		Concave [1.6]				1	1
		Straight [1.6]				1	1
Hinged [9.7]	Unifacial [8.1]	Convex [6.5]	1	2	1		4
		Straight [1.6]		1			1
	Bifacial [1.6]	Straight [1.6]			1		1
TOTAL			16	18	20	8	62

RESHARPENING FLAKES

This category includes flakes removed from the edges of bifaces, and bifacially and unifacially modified implements. The edge of the original object was used as the striking platform. The resulting flake thus retains portions of the edge and surfaces of the parent object. "Resharpening" is a misleading term since the category also includes unworn bifacial thinning flakes. The term is meant to imply that these flakes were detached with the intention of rejuvenating a worn location. Wear damage recorded is primarily unifacial feathered chipping of convex and straight locations (Table 3-20). Some unifacial hinged chipping on convex and straight locations also occurs. Edge angles are similar to those of bifacially retouched flakes. Suggested use is cutting and scraping.

Table 3-20. Wear complexes; resharpening flakes, 45-DO-214.

Kind of wear [% Total]	Location of wear [% Total]	Shape of worn area [% Total]	Zone				Total
			1	2	3	4	
Feathered	Unifacial [68.3]	Convex [36.5]	2	2	3	1	8
		Concave [13.6]		2	1		3
		Straight [18.2]			1	3	4
	Bifacial [4.5]	Convex [4.5]			1		1
Hinged [27.2]	Unifacial [27.2]	Convex [22.7]	4	1			5
		Straight [4.5]			1		1
TOTAL			6	5	7	4	22

LINEAR FLAKE

These flakes are parallel-sided and approximately twice as long as they are wide (Plate 3-3;d,e,f). Width is less than 1 centimeter. The category was created to identify microblades (Sanger 1969). Because diagnostic microblade cores are absent from the 45-DO-214 collection and the flakes in the category do not consistently display the microblade platform characteristics or multiple arrises, the term has not been applied. Wear damage consists of 22 locations of unifacial teathered chipping associated with acute edge angles. Characteristic of the blade-like form, the damage is found on 11 straight, presumably lateral, edges. Eight of the locations are convex and the remaining three are concave.

OTHER GROUND STONE AND SHELL ARTIFACTS

We need also to consider briefly those artifacts not manufactured by chipping and not displaying wear. Included in this group are the ground stone pipes, nephrite and shell beads and the sandstone abraders.

PIPES

The fragmented bowls of three pipes were recovered from 45-DO-214 (Figure 3-16;a through c). Similar forms are described by Collier et al. 1942, Chance and Chance 1982 and Grabert 1970. Two are manufactured from steatite and the third from an indeterminate material. They were recovered from Zones 2 and 3.

BEADS

Four beads manufactured from nephrite and an indeterminate material (Plate 3-3;g through l) were found in Zones 1, 2 and 4. A single dentalium shell bead was recovered from Zone 3 (Plate 3-3;j).

ABRADERS

Eight of the nine abraders are sub-rectangular unifacially grooved pieces of sandstone (Figure 3-16;d) noted elsewhere on the Plateau as occurring in pairs (Collier et al. 1942). They functioned in the straightening and smoothing of wooden and bone shafts. The ninth artifact (Figure 3-16;e) has a wide shallow depression along its length rather than the pronounced groove of the other artifacts. This variation suggests use on other convex surfaces or on shafts of large diameter. All of the artifacts are sandstone and were recovered from Zones 2 and 3 (Table 3-1).

The functional analysis indicates that similar activities occurred in all four zones. While the distribution of kinds of artifacts varies, the uses of the artifacts do not. There is continuity in the kinds of tasks and the tools selected to perform them. Examination of the formal types from the functional perspectives has shown that the type names generally are correct indicators of use. The analysis has also revealed that objects generally considered to have but one function (i.e., projectile points) might be more realistically thought of as multi-purpose tools. It has also refined the description of the utilized/modified debitage by indicating the kinds of tasks for which they were selected.

STYLISTIC ANALYSIS

The purpose of the stylistic analysis of projectile points is to identify morphological characteristics which are sensitive to temporal and spatial cultural variation. By correlating sensitive stylistic types with radiocarbon dates, we can develop a local chronology and sequence of human occupation which can be compared with sequences developed in other regions of the Plateau.

We have developed a two stage analysis for projectile points. The first stage involves the identification of morphological types within the project area independent of consideration of comparative historical types elsewhere on the Plateau. These types have then been ordered into a temporal sequence on the basis of their occurrence in project sites.

The second stage involves the statistical redefinition of the morphological types in terms of established Plateau historical forms. The comparison allows us to quickly correlate our results with those of other Plateau archaeological studies and to focus on trends that may represent cultural differences.

This system of analysis has evolved over the past two years as data from individual site analysis has become available. The entire process and project-wide results will be reported and evaluated in the summary report (Lohse 1984g).

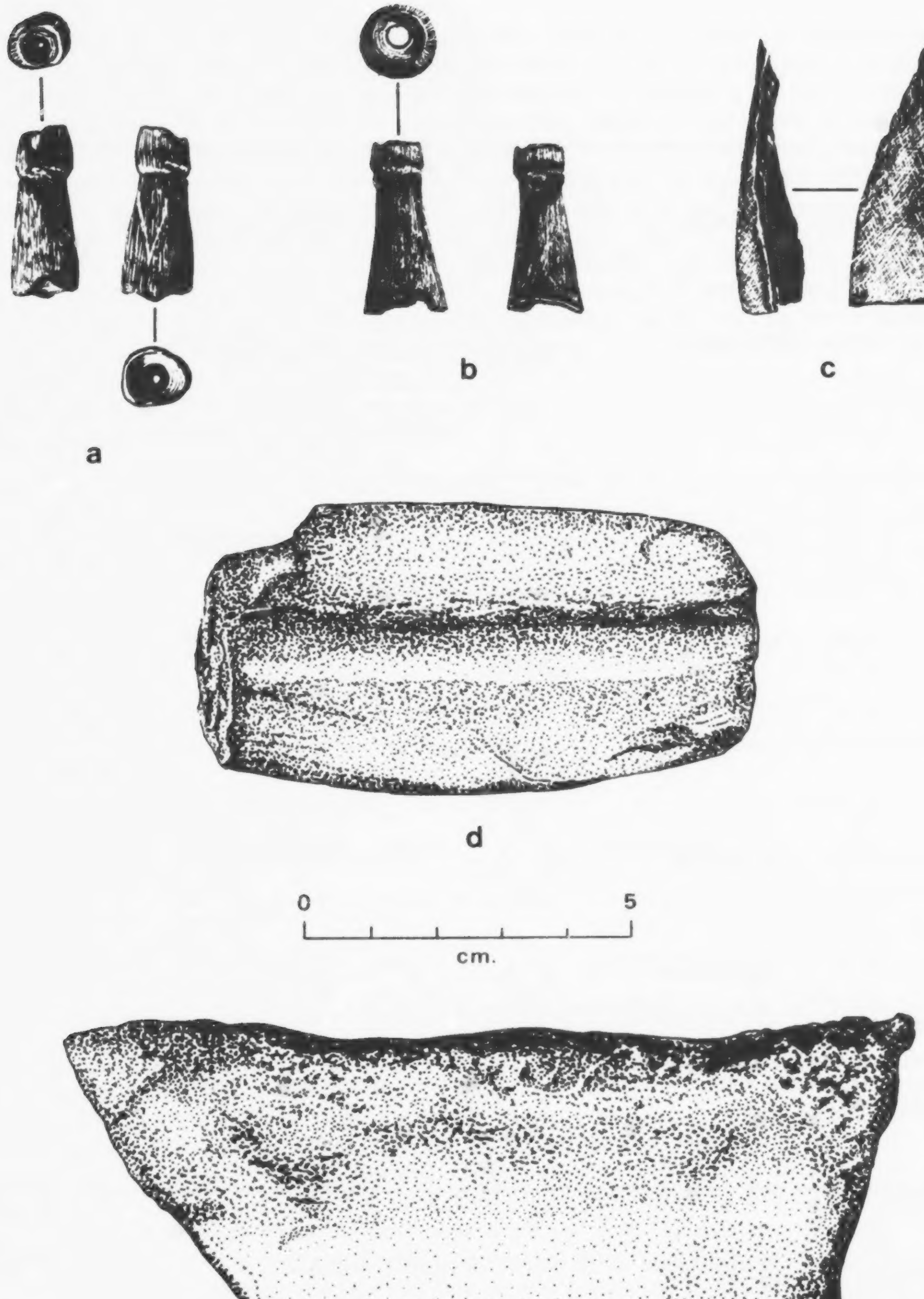
Eleven dimensions of analysis were established for the identification of morphological types (Appendix B, Table 14). Intersection of the first four dimensions, blade-stem juncture, plan, stem-edge orientation and size, defines 18 separate types (Figure 3-17). Intersection of the additional seven

KEY
Master Number:
Tool:
Provenience/Level:
Zone:
Material:

a.	b.	c.
1108	1579	1573
Pipe	Pipe	Pipe Fragment
51N29E/FE7/100	51N27E/110	50N26E/FE5/110
2	3	3
Steatite	Steatite	Indeterminate

d.	e.
1080	1538
Abrader	Abrader
51N28E/120	50N26E/FE5/110
3	3
Sandstone	Sandstone

Figure 3-16. Pipes and abraders, 45-DO-214.


a
b
c
d
0
5
cm.
e

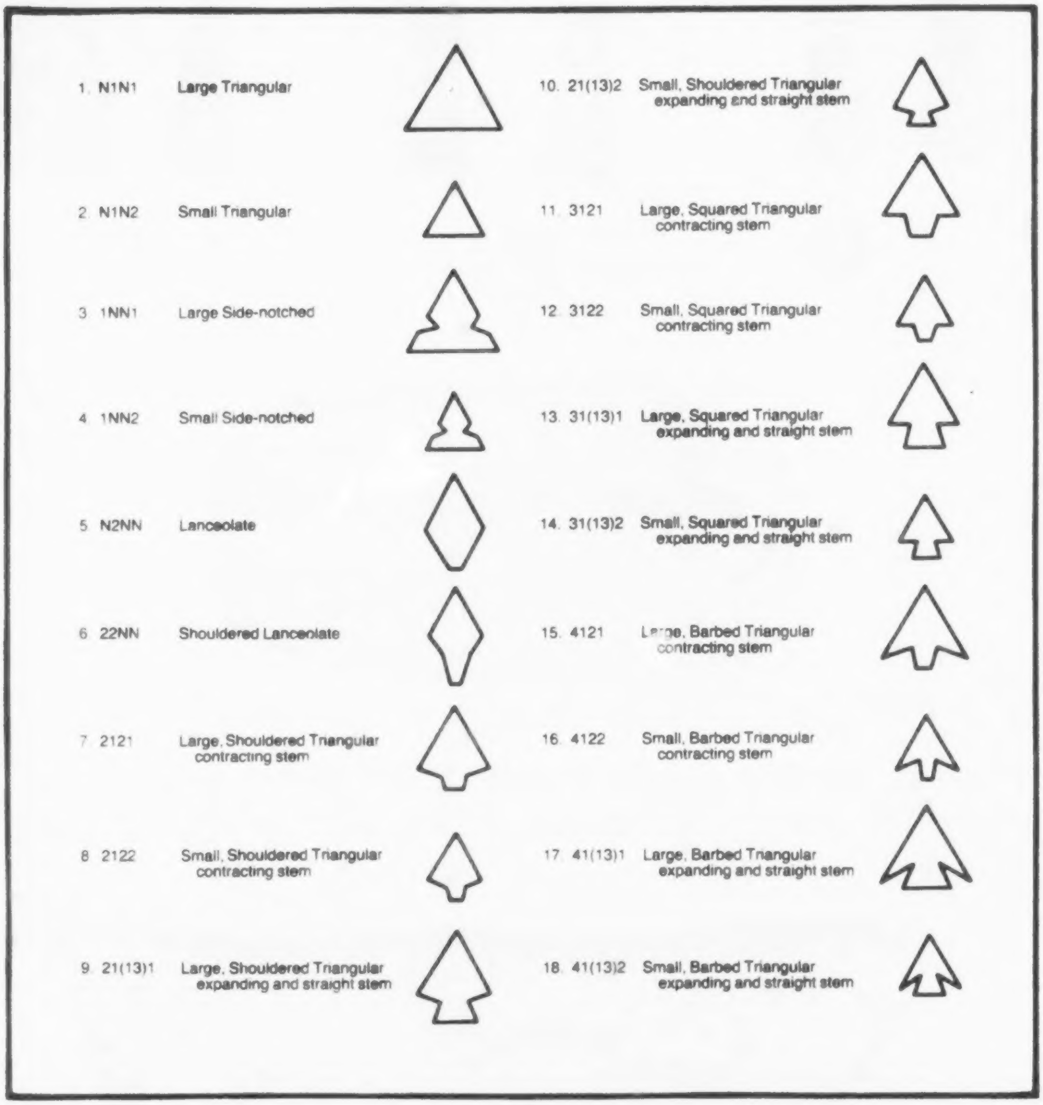

1. N1N1 Large Triangular
2. N1N2 Small Triangular
3. 1NN1 Large Side-notched
4. 1NN2 Small Side-notched
5. N2NN Lanceolate
6. 22NN Shouldered Lanceolate
7. 2121 Large, Shouldered Triangular contracting stem
8. 2122 Small, Shouldered Triangular contracting stem
9. 21(13)1 Large, Shouldered Triangular expanding and straight stem
10. 21(13)2 Small, Shouldered Triangular expanding and straight stem
11. 3121 Large, Squared Triangular contracting stem
12. 3122 Small, Squared Triangular contracting stem
13. 31(13)1 Large, Squared Triangular expanding and straight stem
14. 31(13)2 Small, Squared Triangular expanding and straight stem
15. 4121 Large, Barbed Triangular contracting stem
16. 4122 Small, Barbed Triangular contracting stem
17. 41(13)1 Large, Barbed Triangular expanding and straight stem
18. 41(13)2 Small, Barbed Triangular expanding and straight stem

Figure 3-17. Morphological types of projectile points.

dimensions allows detailed description within the type categories emphasizing variation rather than uniformity. The complete morphological classification of projectile points from 45-DO-214 is presented in Appendix B, Table 15. Discussion here is restricted to classification based on the intersection of the first four dimensions.

Of the 120 whole or broken projectile points recovered from 45-OK-214, 81 could be classified. Fifteen of the 18 morphological types are present in the assemblage (Table 3-21). We do not consider Types 1 and 2 to be finished projectile points (Plate 3-4;z through ee). We think the large triangular forms are more accurately described as knives although a more complete analysis of these kinds of artifacts would be required to verify the proposed function. The small triangular forms we regard as the preform stage of the bifacial reduction sequence. They lack only distinctive basal modification to make them into small stemmed, corner- or side-notched points, forms with which they are contemporaneous (Figure 3-18).

Table 3-21. Morphological projectile point types by analytic zone, 45-DO-214.

Zone	Radiocarbon Date	Estimated Age	Morphological Types															Total
			1	2	6	5	8	11	12	3	13	9	17	10	14	18	4	
1		Proto-Historic 1000 B.P.		2					2						3	7	3	17
2	1170±71		1	4			1	1				1	1	1	5	9	3	27
3	1046±60 1022±65 1112±71 1151±168	1200 B.P.	1	4		1	1	1		1	2	1	1	1	6	5	1	26
Hiatus																		
4		2000 B.P. 4000 B.P.	1	1	1	1	4	2	1									11
TOTAL			3	11	1	2	6	4	3	1	2	2	2	2	14	21	7	81

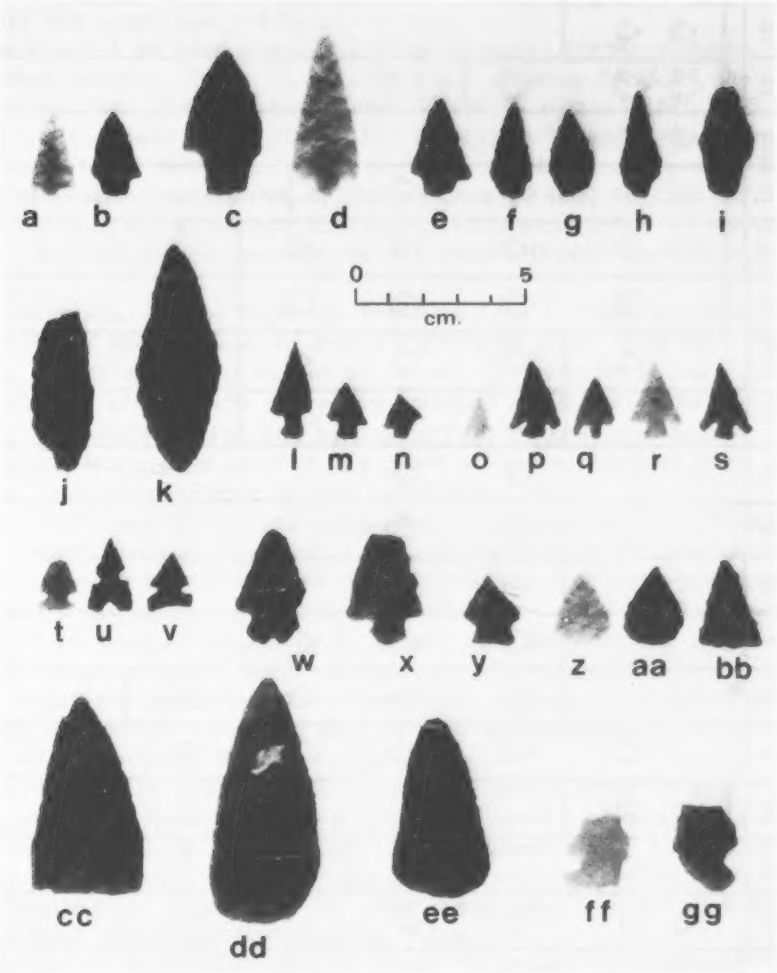
The stylistic variation of the projectile points becomes apparent against the chronological framework (Table 3-21). The types divide into three groups. The diversity of forms is less in Zones 1 and 4 than in Zones 2 and 3, which have the largest sample sizes. Types in Zone 1 are primarily small, triangular stemmed and side-notched forms. In contrast, Zone 4 is characterized by lanceolate and shouldered points. Zones 2 and 3 together have all of the types from Zones 1 and 4 except for Types 6 and 12. In addition, they also have types not found in either Zone 1 or Zone 4.

The types in Zone 4 appear in the project area by 4500 B.P. Types 5 and 6, the lanceolate and shouldered lanceolate, are characteristic of occupations older than about 4500 B.P. The stemmed forms are stylistically dominant from about 4500 to 2000 B.P. Lacking radiocarbon dates for the zone, we estimate

KEY
Master Number:
Morphological Type:
Historical Type:
Provenience/Level:
Zone:
Material:

	Master Number	Morphological Type	Historical Type	Provenience/Level	Zone	Material
a.	1252	12	Rabbit Island B	58N14E/40	1	CCS
b.	1306	12	Rabbit Island B	64N12E/130	4	CCS
c.	280	11	Rabbit Island A	42N17E/110	4	CCS
d.	64	11	Rabbit Island B Testing	50N27E/180A	4	CCS
e.	1255	11	Rabbit Island B	56N14E/160	4	CCS
f.	1261	8	Rabbit Island A	56N15E/190	4	CCS
g.	1283	8	Rabbit Island A	55N14E/70	4	CCS
h.	1330	8	Rabbit Island A	63N12E/130	4	CCS
i.	1289	6	Shouldered Lanceolate	58N15E/160	4	CCS
j.	256	5	Cascade C	63N7E/90	4	Basalt
k.	782	5	Cascade A	47N28E/130	3	CCS
l.	1597	14	Columbia corner-notched B	50N27E/100	3	CCS
m.	690	14	Wallula	47N26E/120	3	CCS
n.	1116	14	Columbia corner-notched B	52N30E/50	1	CCS
o.	951	18	Columbia stemmed C	49N30E/110	3	CCS
p.	376	18	Columbia stemmed C	44N29E/40	1	CCS
q.	911	18	Columbia stemmed A	50N30E/70	1	CCS
r.	337	18	Columbia stemmed A	41N29E/70	1	CCS
s.	1124	18	Columbia stemmed C	52N30E/100	2	CCS
t.	762	4	Plateau side-notched	47N28E/40	1	CCS
u.	1148	4	Plateau side-notched	51N31E/80	1	CCS
v.	813	4	Plateau side-notched	50N30E/80	2	CCS
w.	803	13	Columbia corner-notched A	50N24E/130	3	CCS
x.	1409	13	Quilomene Bar basal-notched	Beach		CCS
y.	646	10	Columbia corner-notched A	48N28E/110	3	CCS
z.	822	2	N/A	48N24E/90	2	CCS
aa.	889	2	N/A	48N28E/70	2	CCS
bb.	848	2	N/A	50N29E/70	2	CCS
cc.	571	1	N/A	46N28E/60	2	CCS
dd.	146	1	N/A	47N24E/100	3	CCS
ee.	254	1	N/A	64N8E/80	4	CCS
ff.	1058	3	Cold Springs side-notched	52N28E/130	3	CCS
gg.	1081	9	Columbia corner-notched A	51N28E/90	2	CCS

Plate 3-4. Examples of projectile points, 45-DO-214.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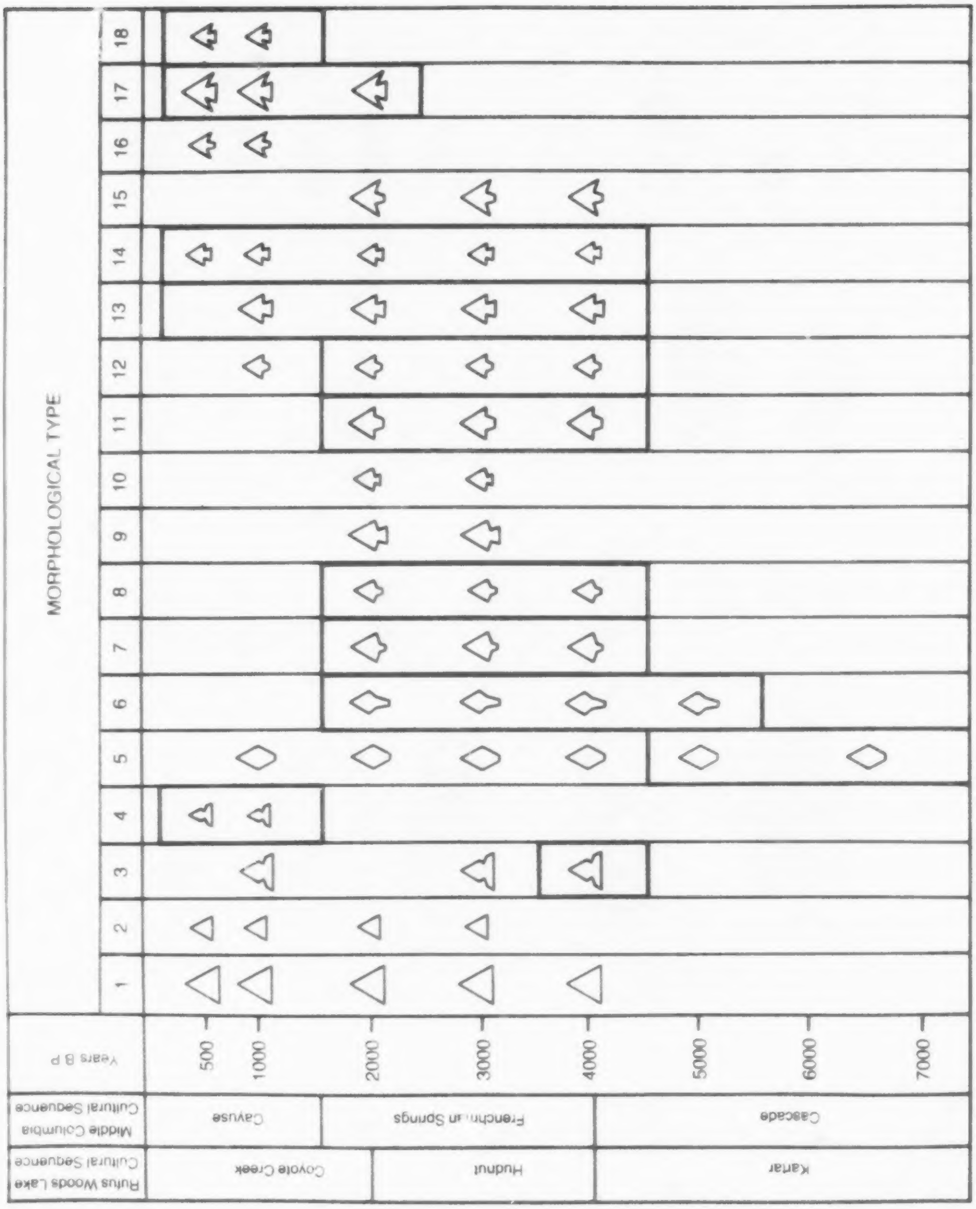

Figure 3-18. Temporal distribution of morphological projectile point types in the project area.

the age of Zone 4 as between 2000 and 4000 B.P., the time span designated as the Hudnut Phase in the project chronology (Figure 3-18). We have little evidence from the rest of the assemblage other than the older lanceolate and shouldered lanceolate forms to suggest an earlier date; the absence of later forms suggests the upper age limit.

In Zones 2 and 3 we have a proliferation of small corner-notched, stemmed and side-notched points. Types 13, 10, 18 and 4 make up 58.5% of the projectile points from these zones. Types 9 and 10 appear after 3000 B.P. and Types 17, 18 and 4 appear after 2000 B.P. The older Types 5, 8, 11 and 3, forms which were found in these zones, are rare or absent after 1500 B.P. We restrict the time span represented by these zones to 1000 to 1200 B.P. on the basis of the radiocarbon dates and the stylistic predominance of the younger point forms. This period corresponds to the Coyote Creek Phase in the project area.

All of the types, except Type 12, found in Zone 1, have a protohistoric upper age limit and most appear in the project area after 1500 B.P. The Type 12 projectile points appear to be out of place. However, they were found in the western portion of the site where the youngest component directly overlies the oldest so that some mixing may have occurred. There is also the possibility they were picked up from the older erosional surface when it was exposed, used, and incorporated in the later deposits.

In the second stage of the analysis, the morphological classification was compared by discriminant analysis to a type collection of 700 specimens. This collection includes 22 historic types with artifacts from well-dated contexts at sites from the Fraser River to the Snake River and from the Dalles to the Libby Reservoir in Montana (Appendix B, Figure 2). Many of the locations are type sites for the projectile point categories. The comparison was made on the basis of digitized measurements (Appendix B, Figure 3). Projectile point outlines based on the landmarks and descriptive measurements and statistics are included in Appendix B, Figure 4, Table 16).

Table 3-22 presents the relation of morphological types to historical types. It is apparent from this table that each system of anaylsis has areas of finer discrimination as well as general correspondences. For example, the Columbia Corner-notched A includes projectile points classified as five different morphological types. On the other hand, the Type 18 projectile points are divided among seven historical types.

Distribution of the historic types among the zones is presented in Table 3-23. We find that the historical types for the most part reinforce the temporal estimates based on the morphological types. Zone 4 has styles similar to those associated with the Frenchman Springs and Chiliwist Phases on the Middle and Upper Columbia (Figure 3-19) (Nelson 1969; Grabert 1968). The later zones contain primarily Cayuse and Cassimer Bar Phase style points. Notably, we find little evidence of styles associated with the intervening time period between Zone 4 and Zone 3. The Quilomene Bar styles found in Zones 2 and 3 at 45-DO-214 are few. At Sunset Creek they are a common form about 2500 B.P., but continue to appear in the Cayuse Phase (Nelson 1969). The sequence at 45-DO-214, logically enough, appears to be more similar to that of the Well's Reservoir with Cascade-like lanceolate, and shouldered

Table 3-22. Morphological types by historical types, 45-DO-214.

Morphological Type		Historical Type																
No.	Code	Cascade A	Cascade C	Shouldered Lanceolate	Cold Springs Side-notched	Nespelem Bar	Rabbit Island Stemmed A	Rabbit Island Stemmed B	Quilomene Bar Corner-notched	Quilomene Bar Basal-notched A	Columbia Corner-notched A	Columbia Corner-notched B	Columbia Stemmed A.	Columbia Stemmed B	Columbia Stemmed C	Wallula Rectangular Stemmed	Plateau side-notched	Not assigned	Total
1	N1N1																	3	3
2	N1N2																	11	11
6	22NN			1															1
5	N2NN	1	1																2
8	2122					5	1												6
11	3121					2	2												4
12	3122						2												2
	3192																	1	1
3	1NM1				1														1
13	3131										2								2
9	2131										2								2
17	4131								2										2
10	2112										2								2
14	3132							1			2	8				1	1		13
18	4132									1	3	1	1	2	8	2			18
	4112												1		2				3
	4192														1				1
4	1NN2											3					4		7
TOTALS		1	1	1	1	7	5	1	2	1	11	12	2	2	11	3	5	15	

Table 3-23. Historical types sorted by analytic zone, 45-DO-214.

Historical Type	Zone				Total
	1	2	3	4	
Cascade A	–	–	1	–	1
Cascade C	–	–	–	1	1
Shouldered lanceolate	–	–	–	1	1
Cold Springs Side-notched	–	–	1	–	1
Nespelem Bar	–	2	–	5	7
Rabbit Island Stemmed A	1	–	2	2	5
Rabbit Island Stemmed B	–	–	1	–	1
Quilomene Bar Corner-notched	–	1	1	–	2
Quilomene Bar Basal-notched A	–	1	–	–	1
Columbia Corner-notched A	3	2	6	–	11
Columbia Corner-notched B	2	6	4	–	12
Columbia Stemmed A	–	2	–	–	2
Columbia Stemmed B	–	1	1	–	2
Columbia Stemmed C	3	5	3	–	11
Wallula Rectangular-Stemmed	2	–	1	–	3
Plateau Side-notched	3	2	–	–	5
N/A	3	5	5	2	15
TOTAL	17	27	26	11	18

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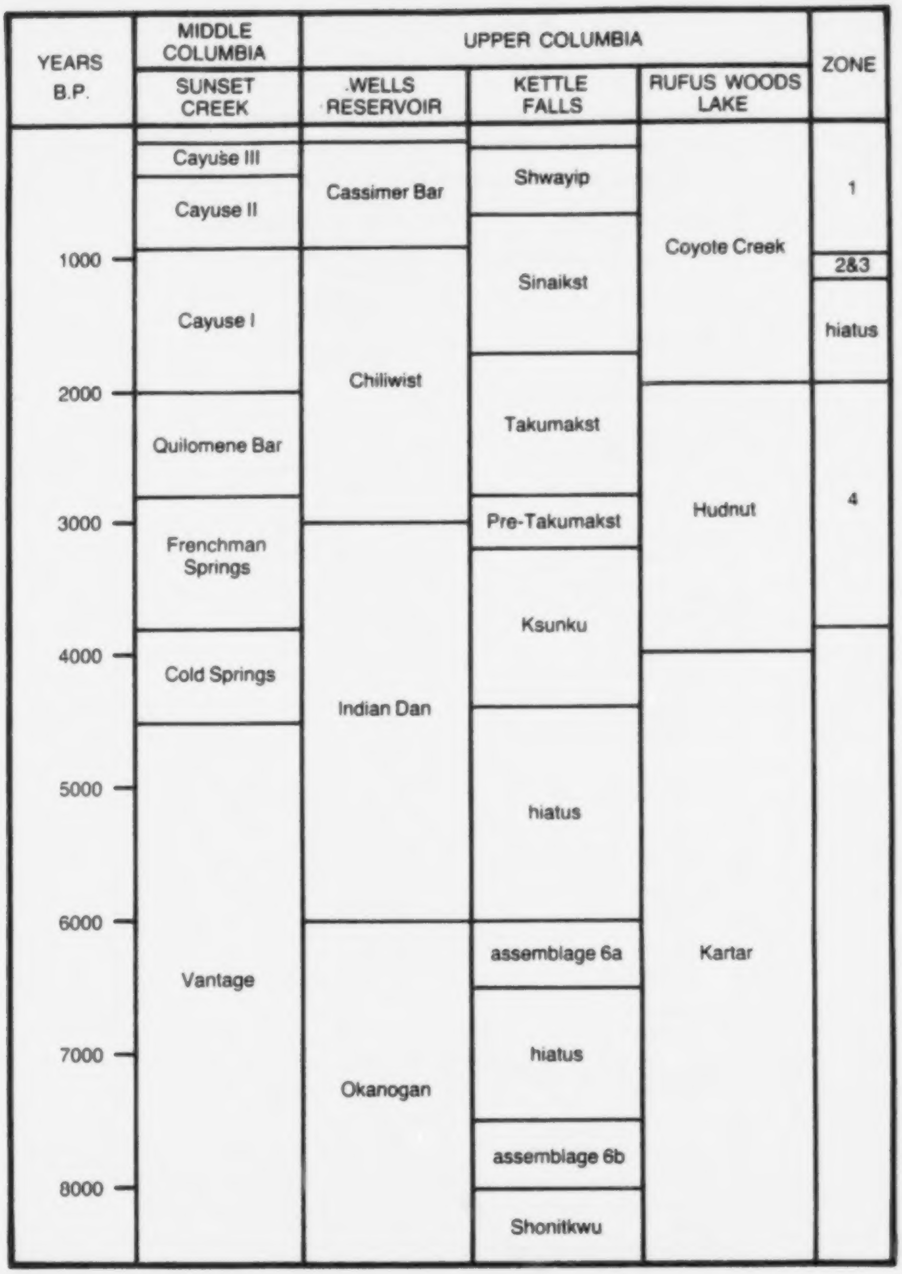


Figure 3-19. Cultural zones at 45-DO-214 in relationship to Rufus Woods Lake cultural phases and cultural sequences of nearby study areas adapted from Nelson 1969, Grabert 1968, Chance and Chance 1977, 1979, 1982.

lanceolate, and stemmed projectile points appearing well into the Chiliwist Phase, but absent from the younger Cassimer Bar Phase (Grabert 1968:150-151).

In summary, we find the sequence of projectile points from 45-DO-214 stylistically similar to those characterizing the equivalent cultural phases shown in Figure 3-19. The morphological and historical styles reinforce the radiocarbon dates of Zones 2 and 3 and allow us to estimate the ages of Zones 1 and 4. The two systems of classification also suggest regional variability in temporal styles between the Upper and Middle Columbia that will be more thoroughly examined in the summary report (Lohse 1984g).

Bone Artifacts

Analysis of bone artifacts from 45-DO-214 is primarily concerned with morphology and evidence of use and manufacture. The individual specimens are described and classified in Appendix B, Table 17. Items which are sufficiently intact for identification include harpoon valves, valved points, and unipoints, awls, wedges, an incised antler handle, and fragments of beads (Table 3-24). The remainder of the collection consists of two classes of pointed artifacts of unknown function, unidentifiable fragments of shaped tools, and fragments of bone displaying some modification.

Two different kinds of composite harpoon valves were recovered. One of the valves has two half sockets (Figure 3-20;b). When two such valves are joined, a conical socket is formed at the proximal end to seat the harpoon foreshaft and another is formed at the distal end to receive a point. The two valves, a detachable unipoint, and a length of retrieval line, when wrapped and cemented together, form a completed three part, composite harpoon head (Figure 3-21).

The other kind of valve is from a two part composite harpoon head (Figure 3-20;a). This valve type has a single socket designed to hold a bone valved unipoint--a distally pointed shaft with one flat side for conjunction with the valve and a socket conjoining with the valve's socket for attachment to a shaft. A valved unipoint recovered (Figure 3-20;d) fits together with the single socket valve.

The four varieties of unipoints differ primarily in cross section, proximal end form, and size. All varieties taper to a well-shaped point at one end. All of the items could be fitted approximately into the point socket of the double socketed harpoon valve (Figure 3-20;b), but only the specimens of the second variety seemed to be of proper length and diameter. Unipoints of varieties 1, 3, and 4 may have been designed to fit heads of different size or to serve another purpose. Because the unipoints show no signs of hafting, they would seem ill-suited to serve as leister or hook barbs.

The round section bipoints are abraded to thin, round or oval cross section with tapering points at either end (Plate 3-4;e). The surfaces are smooth with occasional striae probably resulting from shaping. There is no evidence of hafting or point damage. They may have been used for gorges or the ethnographically reported cross-lashed hook though they are slightly large (Kennedy and Bouchard 1975:22). They may also have served as leister barbs or as tools for perforating soft materials.

KEY Master Number:
Tool:
Provenience/Level:
Zone:

a.
1514
Single socket
harpoon valve
50N26E/FE5/100
3

b.
1497
Double socket
harpoon valve
50N26E/FE5/100
3

c.
1556
Single socket
harpoon valve
50N26E/FE5/100
3

d.
991
Valved unipoint
52N26E/100
3

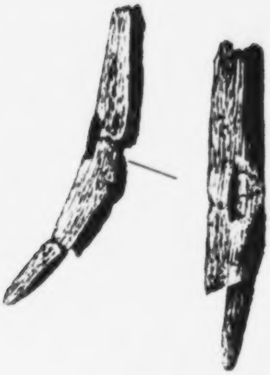
e.
1527/1544
Round section bipoint
50N26E/FE5/110
3

f.
1531
Squared end fragment
50N26E/FE5/110
3

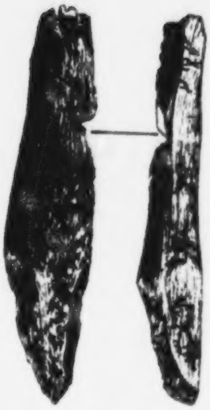
g.
1419
Other fragment
50N26E/90
3

h.
1515
Tubular bead fragment
50N26E/FE5/100
3

Figure 3-20. Bone artifacts, 45-DO-214.



a



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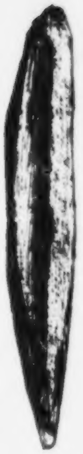

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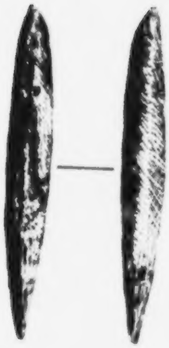

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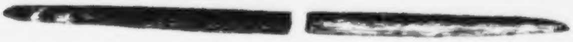

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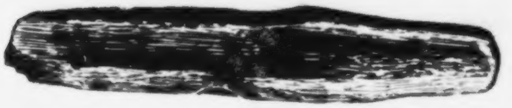

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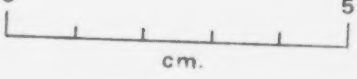

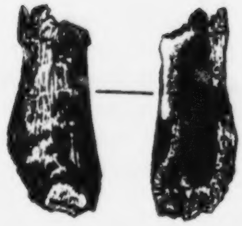

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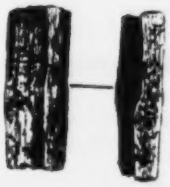

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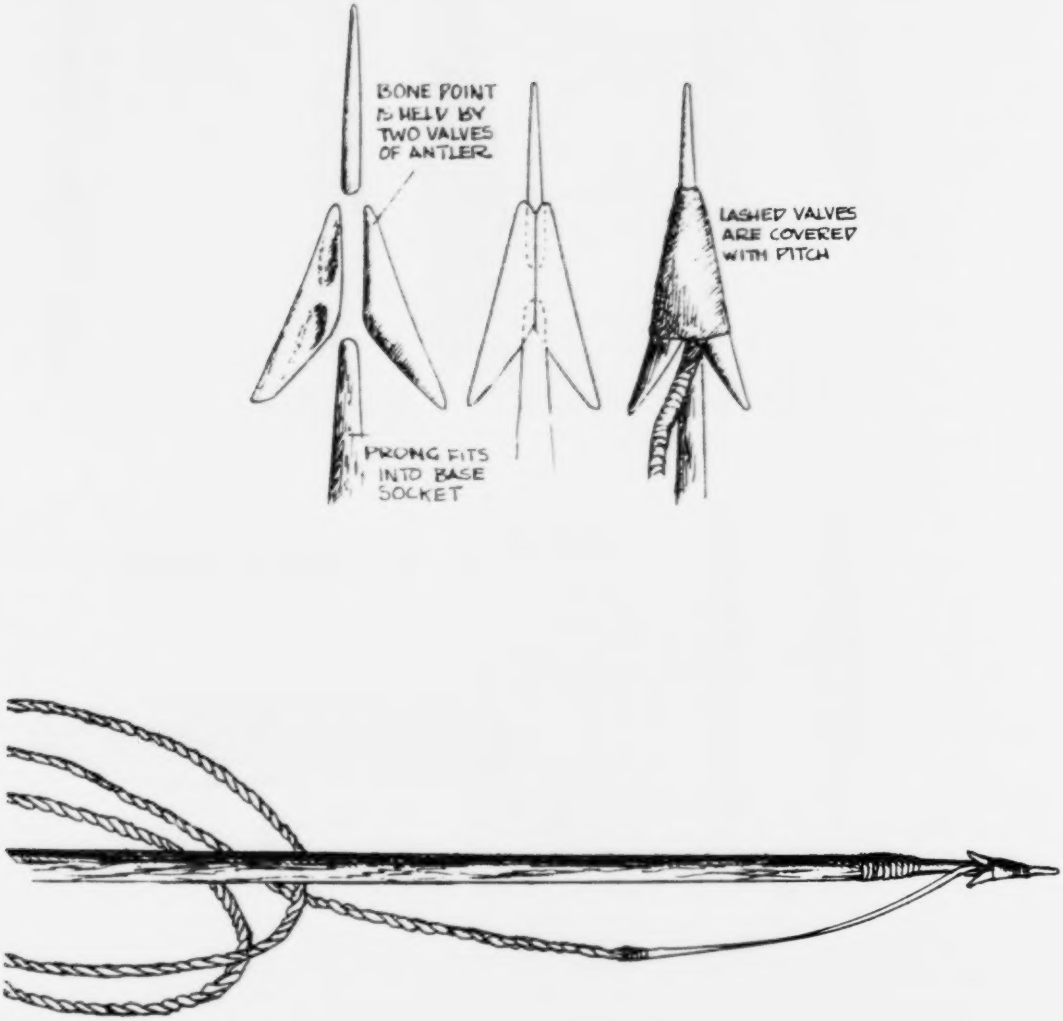
BONE POINT IS HELD BY TWO VALVES OF ANTLER
LASHED VALVES ARE COVERED WITH PITCH
PRONG FITS INTO BASE SOCKET

Figure 3-21. Composite harpoon, illustration from Stewart (1977:71,72).

Table 3-24. Frequencies and description of shaped and partially modified bone artifacts, 45-DO-214.

Object Type	Zone				Total
	1	2	3	4	
Identifiable					
Harpoon valve	–	–	3	–	3
Valved unipoint	–	–	1	–	1
Unipoint	–	2	5	–	7
Round section bipoint	–	–	3	–	3
Flat section bipoint	–	1	2	–	3
Awl	1	–	3	–	4
Handle	–	–	1	–	1
Wedge	–	3	–	–	3
Bone bead	–	–	6	–	6
Fragments					
Proximal end, metapodial	1	–	3	–	4
Pointed end fragment	1	1	4	1	7
Squared end fragment	–	–	2	–	2
Blunted end fragment	–	–	2	–	2
Shaft fragment, no ends	–	–	2	–	2
Other fragment	–	–	2	–	2
Partially modified	1	1	22	–	24
TOTAL	4	8	61	1	74

The flat section bipoints have blunt proximal ends and relatively blunt or abrupt pointed ends. They may have served as needles or perforators, hook barbs or possibly comb teeth (cf. Crabtree 1957).

The awls include artifacts manufactured from large mammal metapodials, ribs and unidentified long bones (Figure 3-22). They are generally associated with perforation in working edges.

The handle consists of a decoratively incised antler tine with a socketed end (Figure 3-23). The socket presumably housed a stone or tooth used as a scraper, engraver, or chisel.

Three antler wedges were recovered (Figures 3-24 and 3-25). One end has been tapered to a wedge shape. Though fragmentary, they were probably used to work wood.

The bone beads are manufactured from cross-sections of small mammal and bird bones (Figure 3-20;h). One is incised.

The remaining classes lack elements to define their functions. The proximal ends of metapodials may be portions of awls or tool handles. The pointed end fragments, as well as the shaft fragments, could have resulted from the breakage of several kinds of unipoints and bipoints. The remaining fragments show various degrees of flaking, polishing, striation and grooving.

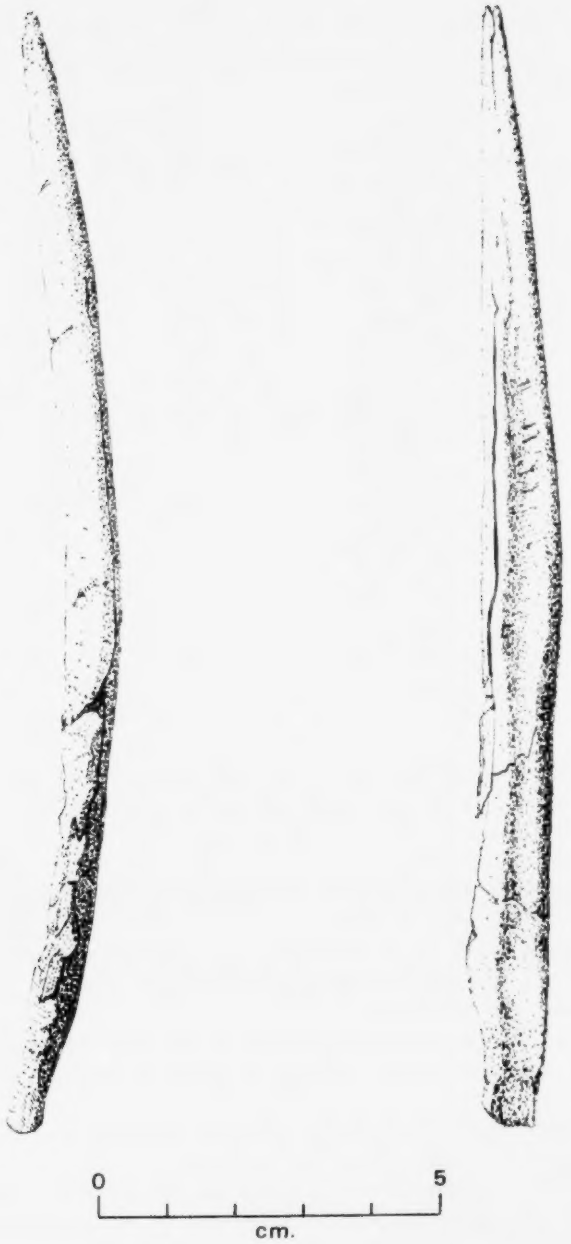

Figure 3-22. Large mammal rib awl, 45-DO-214, M# 1377, 69N26E/100/ Zone 3.

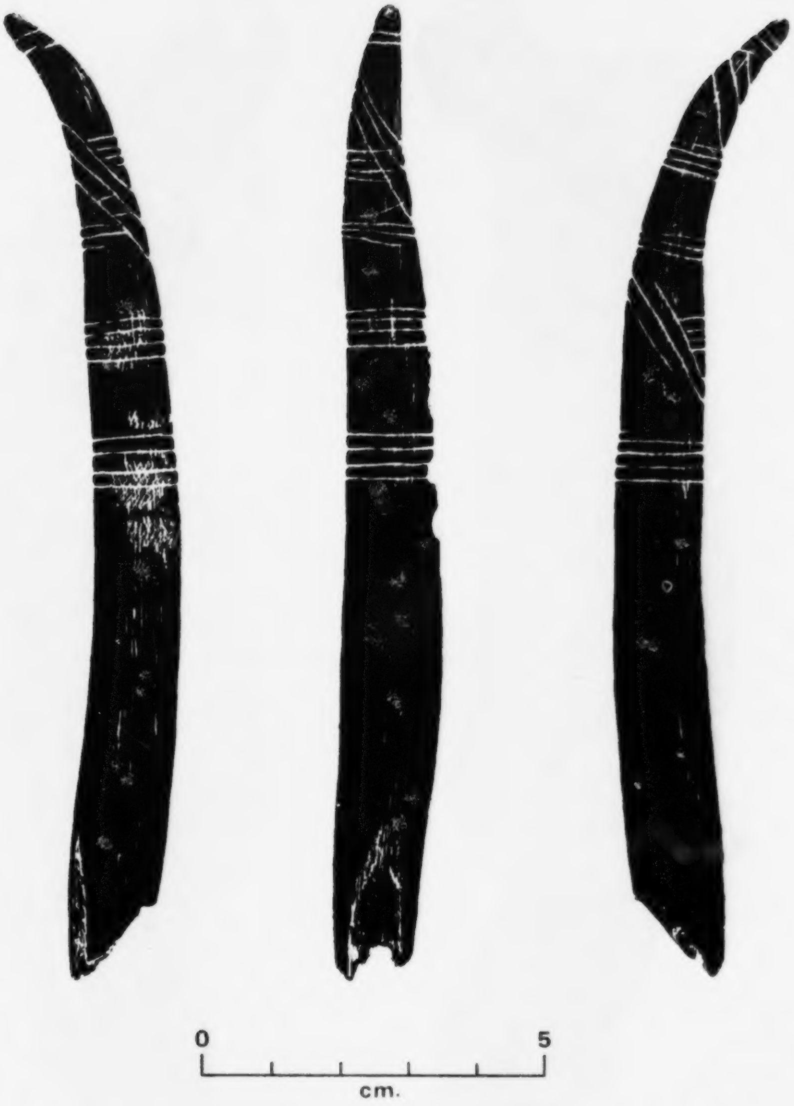

Figure 3-23. Antler tine handle, 45-DO-214, M# 1492, 50N26E/FE5/100/Zone 3.

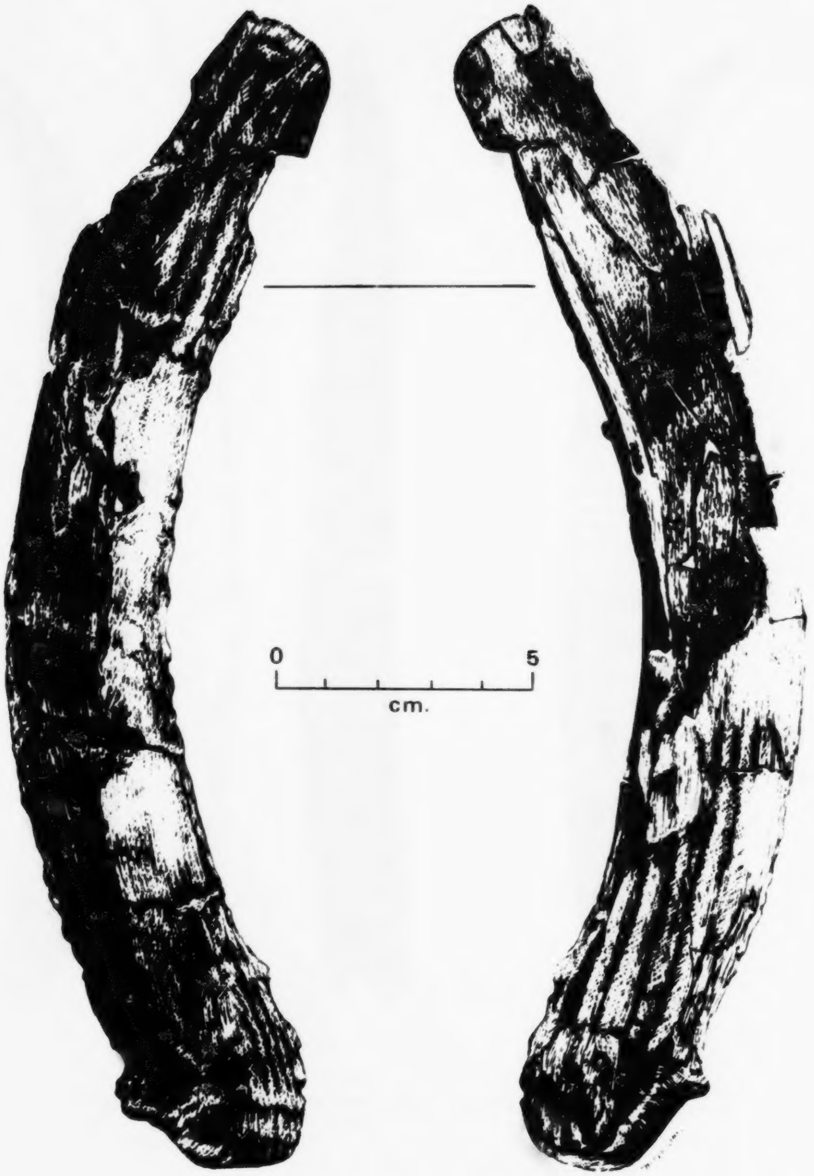

Figure 3-24. Antler wedge, 45-DO- 214, M# 561, 46N27E/45N27E/80-90/Zone 2.

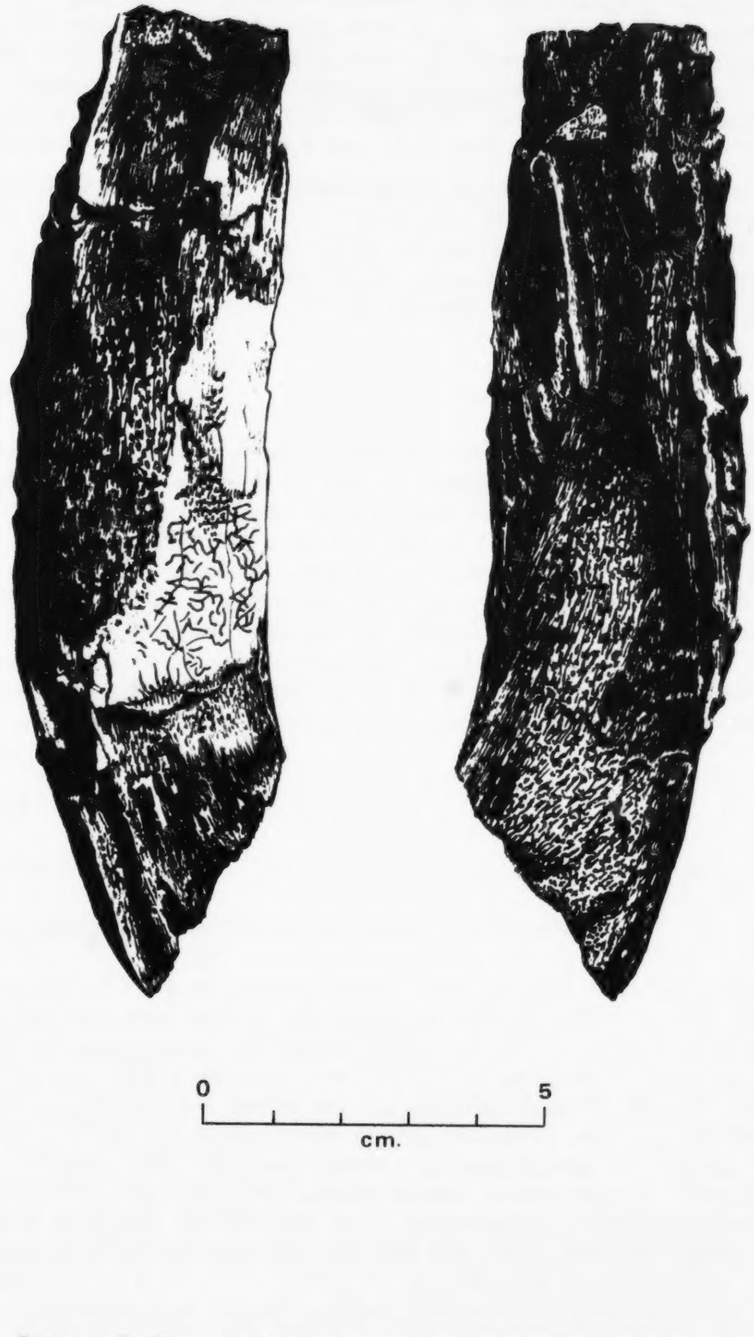

Figure 3-25. Antler wedge, 45-DO-214, M# 1581, 45N27E/90/Zone 2.

Most of the bone artifacts were recovered from Feature 5 in Zone 3. The contents of Feature 5 are presented in Table 6-2, and discussed in Chapters, 4, 5, and 6. Many of the bone artifacts are fishing gear. However, the flat section point, the incised handle, the proximal end fragments, possibly of awls, and other fragments are not clearly related to fishing. The configuration of these tools, along with the lithic artifacts associated with them, suggest bone and woodworking tools and raw materials. The bone end products consist of unmatched finished parts and used and broken implements in various stages of completion. The bead and lithic pipe bowl fragment, perhaps also manufactured with this tool kit, add a non-utilitarian element to the feature.

4. FAUNAL ANALYSIS

Zoological remains from archaeological sites provide a unique source of data on the ecology and historic biogeography of animal species living in the site area, and on utilization of faunal resources by human occupants of the site. This chapter describes the faunal assemblage recovered from 45-DO-214, and summarizes the implications of the assemblage for understanding the archaeology of the site.

FAUNAL ASSEMBLAGE

The faunal assemblage from 45-DO-214 consists of 55,993 bone fragments weighing 27,842 g. Owing to the highly fragmented nature of the sample, only 1,370, or 5% of the sample, are identifiable. 7,770 shell fragments weighing 22,078 g were recovered. The distribution of faunal materials among zones is shown in Table 2-2. Taxonomic composition and distribution of vertebrate remains for the site as a whole and by zone are presented in Table 4-1. Shell materials have not yet been identified. The following summary presents criteria used to identify taxa where applicable, and some remarks concerning past and present distribution and cultural significance of the identified elements. A summary of elements representing each taxon is provided in Appendix C.

SPECIES LIST

MAMMALS (NISP=880)

Lepus cf. _townsendii_ (white-tailed hare) -- 4 elements

Two species of hare presently inhabit the project area _L. townsendii_ (white-tailed hare) and _L. californicus_ (black-tailed hare). A third species, _L. americanus_ (snowshoe hare), inhabits regions adjacent to the project area. These elements could not be assigned to species on the basis of morphological features. _L. californicus_ is thought to have immigrated from the Great Basin during the early part of the twentieth century (Couch 1927; Dalquest 1948). _L. americanus_ is largely nocturnal and secretive, and inhabits wooded areas. Consequently, these specimens have been assigned tentatively to _L. townsendii_. Ethnographically, hares were actively hunted both for fur and meat (Ray 1932:87; Post, in Spier 1938:24).

Table 4-1. Taxonomic composition and distribution of vertebrate remains, 45-DO-214.

Taxa	Zone 1		Zone 2		Zone 3		Zone 4		Site Total	
	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP[1]	MNI[2]
MAMMALIA (NISP=880)										
Leporidae										
Lepus cf. *townsendii*	2	1			2	1			4	1
Sylvilagus nuttallii					1	1			1	1
Sciuridae										
Marmota flaviventris			11	1	11	2	31	3	53	3
Spermophilus sp.			3	–	5	–	31	–	39	–
Spermophilus washingtoni	1	1			4	2	22	12	27	12
Geomyidae										
Thomomys talpoides	12	14	15	3	7	1	68	12	102	14
Heteromyidae										
Perognathus parvus	8	2	18	3	10	4	9	3	45	8
Castoridae										
Castor canadensis							5	1	5	1
Cricetidae					3	–			3	–
Peromyscus maniculatus			4	2			2	1	6	3
Microtus sp.			7	2	5	2			12	2
Lagurus curtatus	5	1	4	2	8	4	6	3	23	9
Ondatra zibethicus	1	1							1	1
Canidae										
Canis sp.			2	1					2	1
Mustelidae										
Taxidea taxus					1	1			1	1
Cervidae			3	–	2	–			5	–
Cervus elaphus					1	1	1	1	2	1
Odocoileus spp.	8	1	72	3	88	3	12	2	181	6
Odocoileus virginianus					1	1			1	1
Antilocapridae										
Antilocapra americana	1	1	12	1	22	3			35	3
Bovidae										
Bison/Bos	1	1	1	1			1	1	3	1
Ovis canadensis	3	1	14	1	17	1	2	1	38	1
Elk-Sized	1	–	5	–	8	–	1	–	15	–
Deer-Sized	16	–	60	–	197	–	5	–	278	–
REPTILIA (NISP=225)										
Chelydridae										
Chrysemys picta	46		157	–	12	–	9	–	224	–
Viperidae										
Crotalus viridis	1	1							1	1
AMPHIBIA (NISP=9)										
Ranidae/Bufonidae	3	3	6	2					9	4
PISCES (NISP=279)										
Salmonidae										
	7	–	40	–	189	–	5	–	241	–
Cyprinidae	3	–	26	–	9	–			38	–
TOTAL	118		450		603		210		1,393	

[1] Number of Identified Specimens.

[2] Minimum Number of Individuals.

Sylvilagus nuttallii (Nuttall's cottontail) -- 1 element.

Silvilagus nuttallii is an abundant resident of rocky sagebrush areas in the project area. Like hares, cottontails were exploited ethnographically for fur and meat (Post, in Spier 1938; Ray 1933).

Marmota flaviventris (yellow-bellied marmot) -- 53 elements.

All marmot remains have been tentatively assigned to the species *M. flaviventris* on the basis of present distribution. This species is the only marmot now living in the project area, and is a common resident of talus slopes. Marmots were exploited as a small game resource by ethnographic inhabitants of eastern Washington (Ray 1932; Post, in Spier 1938). Their presence in this faunal assemblage may indicate prehistoric exploitation.

Spermophilus sp. -- 39 elements.

Three species of ground squirrels are currently found in eastern Washington: *Spermophilus columbianus*, *S. washingtoni*, and *S. townsendii*. *S. columbianus* is larger than the other two and prefers more mesic habitats. *S. washingtoni* and *S. townsendii* are smaller and prefer sagebrush and grass zones to the south and east of the project area (Dalquest 1948:268; Ingles 1965:169). These elements could not be assigned to species. Ground squirrels have been reported as a food resource in the ethnographic literature (Ray 1932:82).

Spermophilus washingtoni (Washington ground squirrel) -- 27 elements.

Thomomys talpoides (northern pocket gopher) -- 102 elements.

Thomomys talpoides is the only geomyid rodent in the project area. There is very little evidence that they were utilized ethnographically or prehistorically. Because pocket gophers are extremely fossorial, their presence in this assemblage may be considered fortuitous.

Perognathus parvus (Great Basin pocket mouse) -- 45 elements.

Perognathus parvus is the only heteromyid rodent known in the project area. Like the pocket gophers, *P. parvus* is most likely present as a result of natural processes.

Castor canadensis (beaver) -- 5 elements.

Beavers are a native inhabitant of a wide variety of river habitats in Washington (Dalquest 1948). There is ethnographic evidence that beaver were exploited (Post, in Spier 1938), presumably for their pelts and as a food resouce, although neither is explicitly stated. Beaver teeth are known to have been used by the Coeur d'Alene to incise wood, bone, antler, and soft stone (Teit 1930).

Peromyscus maniculatus (deer mouse) -- 6 elements.

Peromyscus maniculatus is a resident of all habitat types in the project area. There is no evidence that deer mice were ever exploited.

Microtus spp. (meadow mouse) -- 12 elements.

Three species of *Microtus* occur in the site area: *M. montanus*, *M. pennsylvanicus* and *M. longicaudus*. All three species inhabit marshy areas or live near streams. *M. montanus* can also be found in more xeric areas. None of the elements recovered could be assigned to species. There is no evidence that this genus is present because of cultural process.

Lagurus curtatus (sagebrush vole) -- 23 elements.

The sagebrush vole generally inhabits dry sagebrush habitat which is sparsely grassed (Maser and Storm 1970:142). Only cranial material of this genus is readily distinguished from *Microtus* on osteological bases (Grayson 1984). *L. curtatus* is probably present in this assemblage as a result of natural processes.

Ondatra zibethicus (muskrat) -- 1 element.

Muskrats are residents of cattail marshes, ponds and the banks of slow moving streams throughout the project area (Maser and Storm 1970). Muskrats were exploited by ethnographic residents of eastern Washington during the winter months (Ray 1932). Although muskrats are active year round, the waterproof pelt of the species is at its prime during the winter months. There is no ethnographic record that the meat of this animal was eaten, although it is considered edible in other parts of the country (Ingles 1965:294).

Canis spp. -- 2 elements.

Both *Canis latrans* (coyote) and *C. familiaris* (domestic dog) are common in the project area today. *C. latrans* is an indigenous species, and *C. familiaris* has great antiquity in the northwest (Lawrence 1968). *C. lupus* (wolf) also is known to have been a local resident in the past, but has been locally extinct since about 1920 (Ingles 1965). It was not possible to determine the species of these elements. Dogs were used ethnographically for hunting deer, but were not eaten except in emergencies (Post 1938). Coyotes, however, were considered good food (Ray 1932:90).

Taxidea taxus (badger) -- 1 element.

The badger is a powerful burrower and is found thoughout eastern Washington, though not in large numbers (Ingles 1965). Badgers were trapped regularly by the Sanpoil and Nespelem (Ray 1932:85). This specimen may be present due to cultural processes.

Cervus elaphus (elk) -- 2 elements.

Elk is not a member of the extant local fauna. The closest living population is in the Cascade mountains to the west (Ingles 1965). Elk bones occur in low frequencies in many archaeological sites in eastern Washington, however, indicating that elk once ranged much more extensively than at present and/or that people were traveling great distances to hunt them.

Odocoileus spp. -- 181 elements.

Odocoileus virginianus (white-tailed deer) -- 1 element.

Two species of deer may be represented in this assemblage, *Odocoileus hemionus* and *O. virginianus*. Of all the elements identified as deer, it was only possible to identify one element, an antler fragment, to the species level. Deer are thought to have represented a major food resource to the prehistoric inhabitants of eastern Washington (Gustafson 1972), as they did for the ethnographic cultures (Post, in Spier 1938; Ray 1932).

Antilocapra americana (pronghorn antelope) -- 35 elements.

Although the pronghorn antelope is present today in Washington as an introduced species (Ingles 1965), antelope remains are common in both historic and prehistoric archaeological sites, especially in the arid part of the Columbia Basin (Gustafson 1972, Osborne 1953). There are ethnographic records of hunting practices associated with antelope procurement (Ray 1932; Post, in Spier 1938).

Bos/Bison (cow or bison) -- 3 elements.

Bos taurus (domestic cow) and *Bison bison* (American bison) have both inhabited the project area. Bison are known from eastern Washington assemblages dated between 500 B.C. and A.D. 1500. They have been reported ethnographcally but never were observed in this area by European settlers (Schroedl 1973). Cattle were introduced into eastern Washington in 1834 (Cotton 1904). The close skeletal similarity between *Bos* and *Bison* makes distinguishing between the two extremely difficult (Olsen 1960). The specimens from 45-DO-214 have not been assigned to either of these taxa.

Ovis canadensis (mountain sheep) -- 36 elements.

Mountain sheep elements occur in archaeological sites in eastern Washington with some regularity. The presence of this species is somewhat difficult to interpret, however, because references to it in the ethnographic literature are scarce. Moreover, when competition with man and domestic stock for range became severe during historic times, the habitat preference of this species appears to have changed (Manville, in Monson and Sumner 1980). Mountain sheep are known ethnographically to have been exploited both for meat and as a source of bone for tools (Spinden 1908).

Deer-Sized (deer, sheep, antelope) -- 278 elements.

Elk-Sized (elk, cow, bison) -- 15 elements.

REPTILIA (NISP=225)

Chrysemys picta (painted turtle) -- 224 elements.

Painted turtle is the only turtle currently living in the project area. *Clemmys marmorata* (western pond turtle) has been reported in the eastern part of Washington in the ethnographic literature, but there is no way to ascertain if taxonomic identification is accurate. *C. marmorata* now occur only on the west side of the Cascades and in the southern part of the state. On the basis of present distribution, all turtle remains have been assigned tentatively to *C. picta*. The turtle shell in this assemblage is too fragmentary to determine whether it is carapace or plastron.

Viperidae (rattlesnakes) -- 1 element.

Snake vertebrae were assigned to the family Viperidae on the basis of size. Rattlesnakes are common in the project area, and are probably present in this assemblage due to natural processes.

AMPHIBIA (NISP=9)

Ranidae/Bufonidae (frogs, toads) -- 9 elements.

Both frogs and toads inhabit the project area (Stebbins 1966). Inadequate comparative material precluded assigning these elements to family.

PISCES (NISP=279)

Salmonidae (salmon, trout, whitefish) -- 241 elements.

These vertebrae could belong to any one of at least eight species of salmonid fish known in the project area. All fish vertebrae with parallel-sided fenestrated centra were assigned to this family.

Cyprinidae (carp and minnows) -- 38 elements

Inadequate comparative collections precluded more specific identification of fish vertebrae. Assignment of nonsalmonid fish vertebrae to family was made on the basis of size. At least seven species of cyprinid fish occur in the project area. Some ethnographic groups exploited these fish (Post, in Spier 1938). These fish remains are probably present as a result of human activity.

DISCUSSION

The fauna from 45-DO-214 is representative of archaeological vertebrate faunas from eastern Washington. Most of the species included are current, or at least historic, residents of the project area. Antelope (Antilocapra americana), mountain sheep (Ovis canadensis), bison (Bison sp.), and elk (Cervus elpahus) are rare or absent in the extant local fauna (Payne et al. 1975). However, all have been recorded, at least marginally, in the historic biological literature (Taylor and Shaw 1929; Dalquest 1948; Gibbs 1860), the ethnographic literature (Ray 1932; Post, in Spier 1938), and the archaeological record (Collier et al. 1942; Osborne et al. 1952; Osborne 1953; Schroedl 1973). All other species represented in this assemblage currently occur in or near the site area.

The species accounts above indicate species utilized by aboriginal groups as recorded in the ethnographic literature. Cultural use of faunal resources by prehistoric populations also may be determined by association with other artifactual evidence of human activity, evidence of butchering or burning, and wear or modification of faunal elements.

BUTCHERING

The 45-DO-214 bone assemblage includes 56 fragments that show evidence of wear or manufacture beyond that expected from butchering activities. These bone materials have been treated in Chapter 3. Of the remaining bone assemblage, no identified elements exhibit evidence of burning. Only three identified elements exhibit attributes defined as butchering marks. In Zone 3, a chopping mark was found on an Ovis canadensis humerus. In Zone 4, an Odocoileus spp. naviculocuboid showed striae, and a deer-sized tibia showed a flake.

Because the majority of burned bone and fragments exhibiting indications of butchering occur in the unidentifiable fraction of this assemblage, no inference regarding butchering patterns may be drawn.

SEASONALITY

Two kinds of data that may indicate season of site occupation were recovered from the faunal assemblage. The first is age at death of individuals of taxa with a known season of birth. The age at death of only a single individual could be determined. That individual is an eight month old antelope in Zone 2. Age was determined using dental criteria described by Dow and Wright (1962). Antelope give birth in May or June (Dalquest 1948; Ingles 1965), which makes winter the most likely season of death.

The second source of seasonal data is the occurrence of seasonally active species. Three seasonally active species are represented in this assemblage: marmots (*Marmota flaviventris*), Washington ground squirrels (*Spermophilus washingtoni*) and painted turtles (*Chrysemys picta*). Painted turtle elements were found in all four zones. They hibernate from late October until March or April (Stebbins 1966; Ernst and Barbour 1972), which means they are most easily exploited during the spring and summer months. Marmots were recovered from Zones 2, 3 and 4. Marmots enter estivation as early as June and go into hibernation in August or September. They emerge in March (Dalquest 1948; Ingles 1965). Marmots are active only during the spring months. Washington ground squirrels were recovered from Zones 1, 3 and 4. The *Spermophilus* sp. elements in Zone 2 may also be Washington ground squirrel. Washington ground squirrels begin estivation early in June and emerge in early February (Dalquest 1948). They are active during the late winter and spring.

The faunal seasonal data indicate that all four zones were minimally spring occupations. The single antelope is the only specimen that does not fit a spring interpretation. However, the possibility that the animal was a late season birth or was killed earlier and brought to the site cannot be discounted.

SUMMARY

The mammalian fauna is dominated by small artiodactyls (deer, sheep, and antelope), with a small component of large artiodactyl elements (elk, cow/bison). Most of the assemblage is extremely fragmented, indicating intensive use and/or poor preservation of these taxa. The three recorded butchering marks--on bones of small artiodactyls--did not allow us to make any inferences about patterns of cultural use.

A number of other mammalian taxa are represented that were exploited by ethnographically known peoples for food and other resources such as furs and materials for tools. These taxa include *Spermophilus* sp., *S. washingtoni*, *Marmota flaviventris*, *Ondatra zibethicus*, *Castor canadensis*, *Lepus* cf. *townsendii*, *Sylvilagus nuttallii*, *Taxidea taxus*, and possibly *Canis* sp. Because these taxa are associated with other cultural materials, they are assumed to have been incorporated into this assemblage by cultural mechanisms. Pocket gophers (*Thomomys talpoides*) and mice (*Perognathus parvus*, *Lagurus curtatus*, *Microtus* sp., *Peromyscus maniculatus*) are common in the site area and many are burrowers. They probably occur fortuitously in this assemblage.

The nonmammalian taxa in this assemblage include turtles and at least two kinds of fish that were most likely exploited by the site inhabitants. The frog/toad and the snake are probably present naturally.

5. BOTANICAL ANALYSIS

The study of vegetable materials found in archaeological matrices, termed archaeobotany or paleoethnobotany, (Dennel 1967; Dimbleby 1967; Ford 1979; Renfrew 1973) provide valuable information about the resource base of peoples who inhabited a site. With lithic and faunal materials, they give us the means for making inferences about the peoples' patterns of subsistence, as well as interpreting site features. The presence and condition of specific kinds of fruit seeds and flower parts, for instance, can suggest seasonality of site use.

THE BOTANICAL ASSEMBLAGE

The botanical assemblage from 45-DO-214 consists of more than 64 g of archaeobotanical remains taken from 54 samples. The remains represent 10 families, 17 genera and 14 species of plants. The assemblage is heavily biased in favor of Zone 3; only 12 of the samples are from Zones 1, 2, and 4. The samples from Zone 3--a combination of flotation (flot), radiocarbon and other types of bulk samples--are from a small area associated with Testing Feature A (a possible hearth) and with Feature 5, a concentration of bone, lithic, and botanical artifacts. About 99%, by weight, of the botanical remains come from an area which encompasses five m^2 and two or three unit levels (UL).

TESTING MATERIALS

Twenty samples from test unit 50N27E were subjected to sugar flotation and examined. They ranged in depth from UL 20 to UL 200 and represent all analytic zones. Approximately 0.50 g of archaeological carbon were taken from 2.9 kg of soil for a unit carbon:noncarbon ratio of 1.5% (Figure 5-1). Seven carbon samples (total weight, 22.5 g), associated with Feature A in Zone 3, were also examined from this unit. Another carbon sample, not available for archaeobotanical analysis, dated this feature to 1151±168 B.P. Because of the similar nature of the botanical materials in Feature A and in Feature 5 in adjacent unit 50N26E, the date probably is applicable to Feature 5 as well.

Carbon ratios, radiocarbon dates and carbon purity are shown in Figure 5-1. Two flotation samples were not put on the chart (Flots 16 and 17). These were taken from the northeastern quadrant of the unit, some distance from most of the testing flots, which were taken from the northwestern quadrant. Those from unit levels 90 and 100 are from Feature A. They contain the highest

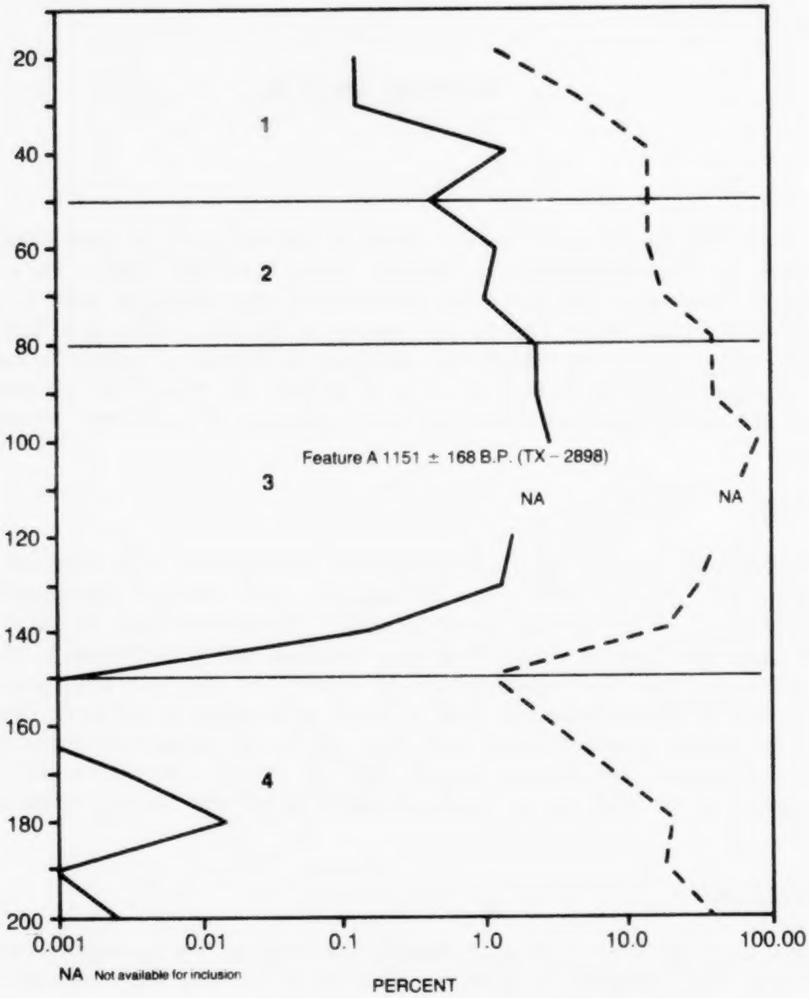

Figure 5-1. Carbon to soil ratio (solid line) and carbon purity (dotted line) by analytic zone, radiocarbon year, and unit level, testing unit 50N27E, 45-DO-214.

carbon ratio, about 5%, and the highest purity ratings (to 90%) of all samples.

The top of Zone 3 has very high levels of archaeological carbon, but all samples except Flot 41, from the center of Feature A, have a moderately low purity level of about 50%-60%. In this case, contaminants include dozens of tiny trimming or pressure flakes and bone and shell fragments, which weigh a great deal.

The testing assemblage is shown in Table 5-1. Except for three samples (Flot 41 from Feature A and Flots 24 and 25 from levels 190 and 200), the soil samples average about 75 g. Usually such small amounts do not produce much carbon, and standard subsamples of 1 g ≥2.0 mm in diameter cannot be drawn. The testing samples, however, were taken from very productive soil. We were able to examine subsamples at the 0.01 g (2.0-1.0 mm) level for all flots. Carbon samples collected for possible C-14 dating aided identification.

Table 5-1. Flotation assemblage from testing unit 50N27E (N=20), 45-DO-214.

Identifiable Botanical Material	g	#
Conifer (62%)		
Ponderosa pine	0.01	3
Lodgepole pine	0.03	2
Yellow pine	0.03	13
Douglas fir	0.09	15
Pinaceae	-0.01	2
Yellow cedar	0.01	1
Red cedar	-0.01	2
Cupressaceae	0.08	8
Yew	0.03	5
Needle	-0.01	2
Bark	-0.01	3
Other	0.03	6
Hardwood (22%)		
Serviceberry	0.01	2
Hawthorn	-0.01	2
Bitterbrush	0.03	3
Oceanspray	0.01	2
Serv/Haw	0.04	4
Rosaceae	0.01	5
Bark	0.01	6
Other	-0.01	3
Edibles (2%)		
Root tissue	0.01	2
Pine seed	-0.01	1
Knotweed seed	-0.01	1
Other Tissue (14%)		
Bitterbrush seed	0.01	4
Other seeds	0.01	6
Grass	-0.01	2
Leaf	-0.01	3
Bark	-0.01	2
Herbaceous stem	0.03	5
Other	0.03	28
TOTAL	0.51	

Data Recovery Material

Over 41 g of charred, partially charred, and uncharred botanical materials were examined for salvage unit 50N26E, which contained remains of a concentration of bone, stone, and botanical artifacts known as Feature 5. The botanical artifacts and materials from soil surrounding the feature in the unit's northwest, southwest, and southeastern quadrants were examined as well. Materials from the northeastern quadrant technically belong to testing unit 50N27E from which the flots were taken and Feature A emerged. Thus, the two units are tied together by proximity. Similar botanical materials from Features 5 and A and from surrounding soil also tie 50N26E and the test unit together.

The salvage assemblage includes such exotic materials as yew, Alaska yellow cedar, red cedar, and spruce (Table 5-2, and Appendix D). Other materials, retrieved from less distant sources, but no less interesting, include Indian hemp fiber and oceanspray wood. Artifacts were found in relative abundance in and around the feature. They include three wood spatulate or knifelike objects wrapped in birch bark, and a cedar spatulate item about the size of a modern tongue depressor and a haft for a composite tool. All of these will be discussed in greater detail.

In sum, most of the material from 45-DO-214 comes from a specialized region in Zone 3. Thus, most of what we know about the archaeobotany of the site derives from a limited sample dating to about 1,100 years ago.

The botanical assemblage from testing and salvage samples is presented below, arranged alphabetically by family, genus, and species. Possible uses are suggested from information supplied by ethnographic, ethnobotanical, and medical botanical sources. Seasonality data are included where available.

ACERACEAE (Maple Family)

Acer _circinatum_ Pursh (vine maple)

A small amount of vine maple charcoal was found in soil surrounding Feature 5 in Zone 3. Vine maple grows as a shrub or small tree, sometimes forming dense thickets in moist soil and on banks of streams. The plant is shade tolerant and commonly forms part of the forest understory. Under good conditions trunks can reach diameters of 15 cm. Maple reportedly was used for small utilitarian objects such as tool handles and bent wood frames. It can also be used as fuel. Although this species is not named specifically among the Okanogan-Colville, Douglas or rocky mountain maple (_Acer_ _glabrum_) was used extensively (Turner 1979:156) for such items. Vine maple wood might have been used as well where the ranges of the two species overlap (Turner 1979:156). Vine maple has been found in a prehistoric rockshelter, 45-GR-2, excavated near Coulee Dam in 1950 (Mills and Osborne 1952).

Table 5-2. Botanical assemblage of Zone 3 by unit level (N=5), Feature A flots (N=8), and radiocarbon samples (N=7), 45-DO-214.

Identifiable Botanical Material	Unit Levels		Feature A		C14 Samples	
	g	#	g	#	g	#
Conifer						
Ponderosa pine	0.01	1	–	–	0.43*	1
Lodgepole pine	0.01	1	–	–	0.78	1
Yellow pine	0.02	5	0.02	2	1.03	1
Douglas fir	0.04*	3	0.03	3	17.71*	3
Spruce	–	–	–	–	0.10	1
Pinaceae						
Yellow cedar	–	–	0.01	1	0.02*	2
Red cedar	–	–	-0.01	1	0.01*	1
Cupressaceae	-0.01	3	0.06	1	0.25*	1
Yew	0.01	2	-0.01	1	0.67*	3
Needle	–	–	-0.01	1	–	–
Cone	-0.01	1	–	–	–	–
Bark	–	–	-0.01	1	–	–
Other	-0.01	1	0.03	2	–	–
Hardwood						
Bitterbrush	–	–	0.01	1	–	–
Serv/Haw	–	–	0.01	1	–	–
Oceanspray	–	–	0.01	1	–	–
Rosaceae	-0.01	3	–	–	–	–
Mock orange	–	–	–	–	1.01	1
Birch bark	–	–	–	–	0.26*	2
Other	–	–	0.01	2	0.01	1
Edibles						
Pine seed	–	–	-0.01	1	–	–
Other seed	–	–	0.01	1	–	–
Other Tissue						
Bitterbrush seed	0.01	1	-0.01	1	–	–
Grass	–	–	-0.01	1	0.25	1
Leaf	–	–	-0.01	1		
Herbaceous stem	-0.01	1	–	–	–	–
Other	0.03	7	-0.01	3	0.01	1
TOTAL	0.13		0.19		22.54	

* Partially carbonized material present.

APOCYNACEAE (Dogbane Family)

Apocynum L. (Indian hemp, dogbane)

Hemp fibers were found in three samples (M#1493, M#1504, and M#1520) containing birch bark wrapped objects made of pine and Douglas fir, as well as loose strips that may have been part of those constructions. In all three cases, the fibers, which are not carbonized, appear to be accidentally attached to the outside of the bark-wrapped tool. Both fibers and bark are coated with a dark, resinous substance, possibly pine pitch, which has helped preserve the delicate fibers.

Some of the fibers have been completely retted, or cleaned; others are still partially embedded in stem tissue. Where portions of plant epithelium can be observed, it is clear that the surface lacks hairs -- as do all Apocynum samples in our comparative collection. This distinguishes them from the fibers produced by milkweed and stinging nettles. While the fibers from these two local plants are hemplike, they also bear epithelial hairs, which hemp does not. While identification of the fibers as Indian hemp seems secure, there is no way to distinguish which of two species (A. androsaemifolium, A. cannabinum) or the hybrid of those species (A. medium) they represent. Small amounts of the three are present in the study area (Coyote Canyon and the mouth of the Nespelem River). The largest aboriginal stand is said to have been located at the southern end of Omak Lake (Post and Commons, in Spier 1938:68), where the plants apparently were numerous enough to draw families for a two week harvest in the fall (Ray 1932:36). Plants were cut, soaked to loosen the fibers from the stem, scraped with a sharp flint, and rubbed by hand into bundles or into cordage of various thicknesses.

Uses for this favored cordage material are too numerous to detail. In general, hemp was used when fine cordage of great strength and durability was needed: for deer and fish netting, bowstrings, weft elements for woven mats of tule (bulrush) and grass, clothing, flexible storage baskets, tumplines, slings, and noose material, and for attaching haft elements (often pitch coated), and constructing composite harpoons (Post and Commons, in Spier 1938:57,60,63-64; Ray 1932:36,38,69,89). Ray also reports that hanks of the material were included in sewing kits made from skin, complete with bone needles and other objects (Ray 1932).

Although this is the first example of Apocynum fiber found in the study area thus far, it is not the first discovered in the upper Grand Coulee vicinity. Cordage and fiber hanks were found in rock shelter 45-GR-2 a few miles southwest of Grand Coulee Dam. The shelter contained wooden objects, plants, textiles, projectile points, and pictographs. The cordage varied from 64 mm to 8 mm in diameter and was used in bulrush and ryegrass mats, on animal hide, and for bow cord and nets (Mills and Osborne 1952:354-355).

BETULACEAE (Birch Family)

Betula occidentalis Hook (western birch)

Western birch is a medium-sized tree with brown bark covered with elongated lenticels (raised regions of loosely arranged cells). Only bark (25 g) is found at 45-DO-214. All of it has been split into thin layers and cut and torn into long, parallel-sided strips. While these strips range from 2 to 12 mm in width, most are about 4-7 mm wide and 5 cm long. Much of the bark (77%) is cemented in place to form a loose weave or wrapping several layers thick for shaped pine and fir wood objects. Bark, either as part of these constructions or as loose pieces, is found in most (63%) of the salvage samples. In addition, a finely made haft wrapping may be of birch bark (M#1601). Bark strips were found in two testing phase samples from Zone 3. These uncharred strips were coated with a pitchlike substance. Condition of the bark varies. Two of the samples are charred, four are unburned, and the remainder have both charred and unburned areas. The uncharred pieces have been heated, but not enough to carbonize them. The surfaces of such strips are bumpy, forced outward by expansion cavities.
The principal use of birch bark reported in the ethnographic literature is for containers and canoes. These were said to be made solely from white or paper birch (B. papyrifera) because it peels readily. According to some sources, B. occidentalis was not used because it was not as suitable (Post and Commons, in Spier 1938:64; Turner 1979:195-196; Turner et al. 1980:89-90). Ray reports only that an unspecified birch bark was used in making baskets and emergency cooking vessels (1932:38). No mention of woven bark strips appears in the literature, and western birch is not mentioned, except as possible fuel.

Although this appears to be a case of archaeological use without ethnographic parallel, ethnographic accounts may be misleading. Hitchcock et al. (1964, Volume 2:78-81) and Turner (1979:195) have noted that there has been a great deal of hybridization between paper and western birches. There are at least eight variants in the B. occidentalis - B. papyrifera complex. Some have freely peeling bark, while others do not. Some have bark with peeling qualities that have not yet been described Thus, several members of the complex possess bark of the same working qualities as paper birch. Samples of western birch collected by the Kartar road near Disautel Pass peel and split easily and possess excellent working qualities. A few trees in that area are scarred where bark has been removed.

CUPRESSACEAE (Cypress Family)

Chamaecyparis nootkatensis (D. Donn) Spach (Alaska cedar, yellow cedar)

Partially charred yellow cedar was found in 7% of the samples. All are from Zone 3. The largest sample is from Feature A (Radiocarbon Sample 36). Other examples of this rare wood were found in Flot 41 in Feature A and in two samples taken near Feature 5. These later samples also contain other rare woods such as yew and red cedar.

At present, yellow cedar is not found on the Colville Reservation. It is largely a coastal species, sparsely distributed east of the Cascade Mountains. The nearest present source is the Slocan Lake region north of Castelgar in British Columbia (Hosie 1979:102). Since the Slocan River drains into the Columbia in Canada, stray logs may have reached the site by river. One mature log was observed in a pile of river drift collected by Coulee Dam river patrols in 1981. It had been felled by saw and the bark was largely intact.

Coastal peoples used yellow cedar for a variety of construction purposes. The bark was as highly valued as that of red cedar. Bows from the wood were traded widely (Turner 1979:70-71).

Thuja plicata Donn (red cedar, western red cedar)

Red cedar is found in seven of 54, or 13%, of the samples at 45-DO-214. All the samples are from Zone 3 and soil associated with the two features. These include Flots 15 and 41, a radiocarbon sample (RC36), a wood tool (M#1604) (Figure 5-2), and three samples of miscellaneous charcoal from levels 90, 100 and 110 surrounding Feature 5 (M#1605, M#1607, and M#1609). The uncharred wooden tool is about 13 cm long, 2 cm broad, and 0.6 cm wide and resembles a stubby bread knife. Both ends appear worn; the wood is uncarbonized. Its function is unknown. Post and Commons describe a food stirrer something like this object: "about twelve inches long, whittled flat at one end for half its length" (in Spier 1938:60). The other examples of cedar are incompletely charred. All are mature wood.

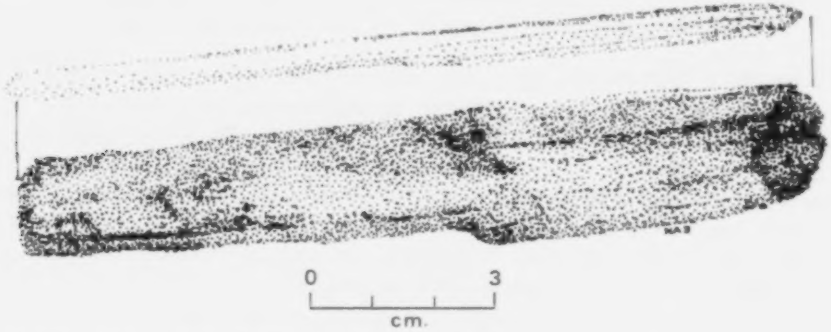

Figure 5-2. Red cedar tool, 45-DO-214.

Cedar is an excellent wood for construction where lightness, strength and durability are required. It is decay resistant, and because of its uniform texture, it can be split easily. Such attributes make it unlikely that the wood was collected as fuel. The nearest local source for trees is near

Inchelium, approximately 50 miles upriver from the site. Red cedar logs have been observed in drift piles swept from the Columbia River by Coulee Dam log patrols. Ray observed that cedar logs pulled from the river were made into canoes, planks for semi-subterranean houses, bow staves, and cooking utensils (1932:31, 199). Informants claim that paddles always were constructed of cedar because of its lightness (Ray 1932:119). Floats, net shafts, net weights, and salmon-drying splints commonly were made of cedar (Ray 1932:68-69; Post, in Spier 1938:15-16).

Other Cupressaceae

Small samples of wood from the cypress family appear in Zones 1, 2, 3, and 4, Levels 40-140. These pieces are too small to identify positively, although many resemble red and yellow cedar. A third species also may be present.

HYDRANGEACEAE (Hydrangea Family)

Philadephus lewisii Pursh (mock orange)

Four tiny pieces of charred mock orange wood were found with the bark haft (M#1601) in Feature 5, Zone 3 (Plate 5-1). The pieces fit together to form a squarish or rectangular object with a surviving length of 8 mm and a height and width from 2.5 to 3.5 mm. One end has been cut or trimmed bluntly. No bevel is present, as should be the case if this were a point attached to the shaft as the bark wrappings suggest. Furthermore, the relationship of the worked mock orange to the bark is problematic. The bark is not carbonized; the wood is charred and seems too small to have been part of the wood shaft. Measurement of the inside diameter of the haft wrapping indicates that the enclosed shaft was 4-6 mm in diameter. The association of the wrapping and the wood may be accidental, or the wood may be part of another artifact in Feature 5. Plate 5-2 pictures a reconstruction of the haft. A sample of charred wood was also found in a carbon sample (RC29) in Zone 3.

Ethnographic sources agree that mock orange was a valuable wood for bows, arrow shafts, and foreshafts or side prongs in salmon spears (Ray 1932:87, Turner 1979:222-224; Turner et al. 1980:108). Mock orange is available locally within the guide-taking lines.

PINACEAE (Pine Family)

Yellow Pine

The yellow pine category is large in the flot material. Most of the yellow pine is ponderosa, but lodgepole is present as well. Where samples are small and contain both bole and branch material, specific names cannot be

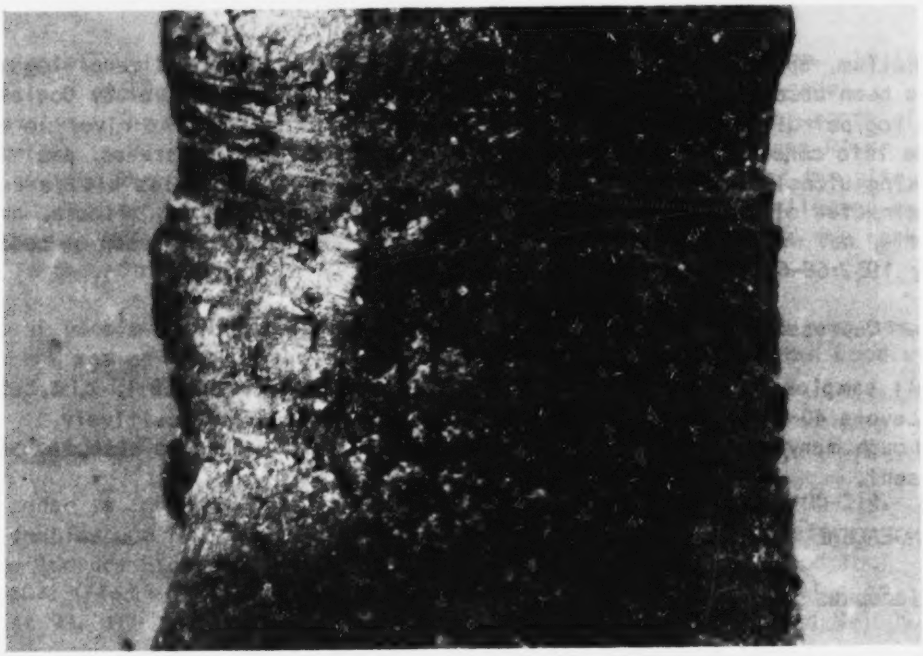

Plate 5-1. Bark haft (M#1601) found with charred mock orange artifact, 45-DO-214. Note careful construction. Width is 7 mm.

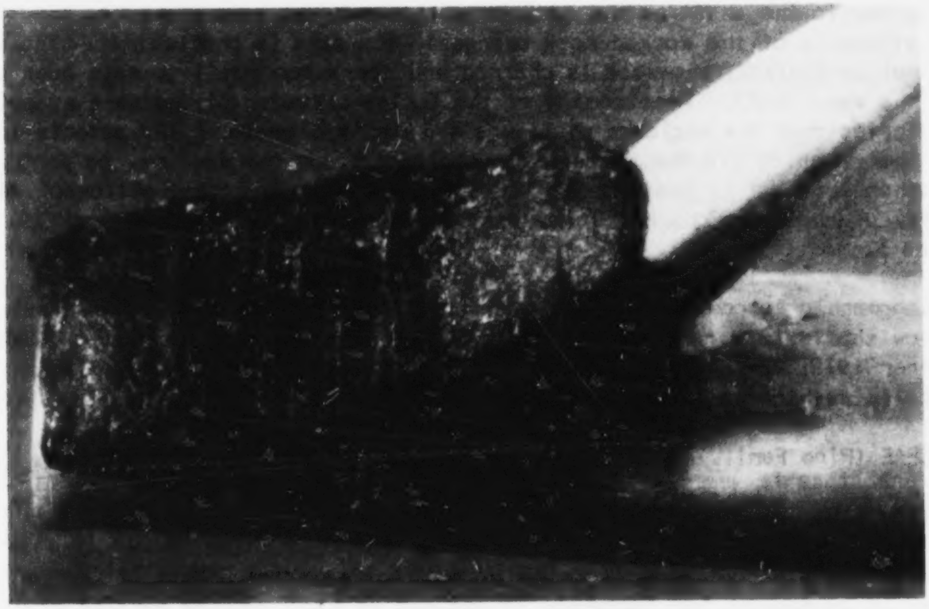

Plate 5-2. Reconstructed haft (M#1601), 45-DO-214. Light wood under bark is modern. Angle of barb is 45 degrees.

attached. The term yellow pine is used for both species. Both are suitable building material in general, and both are good fuel.

In samples other than flots, the division is weighted more toward ponderosa pine. In Feature A, one of the samples is ponderosa (RC32) and one is lodgepole (RC49). The latter is associated with a date of 1151±168 B.P. Only one of the samples pertinent to Feature 5 is lodgepole, while five are ponderosa pine. Two of these are bark wrapped objects (M#1518 and M#1505, (Figure 5-3) believed to be part of the same knifelike artifact. The object is flat, widest at the top, and about 2 cm broad. Measurements taken at the widest portion indicate that it was at least 3 mm thick and probably thicker. The wood width reflects collapse of the early wood cells before burial. Preservative used in the field has glued bark to wood so firmly that they cannot be separated. The negative mould of the wrappings indicates that the object was pointed and had a knifelike edge for at least half its existing length near the tip. The object seems too broad to be a mat making tool. While it may be like a cambium knife in shape, it is made from the wrong material. Turner notes that such knives were made from dull deer rib (Turner et al. 1980:32). A cambium knife shown in a photograph appears to be of bone (Turner et al. 1980:33). Its shape is not unlike that of our reconstructed implement.

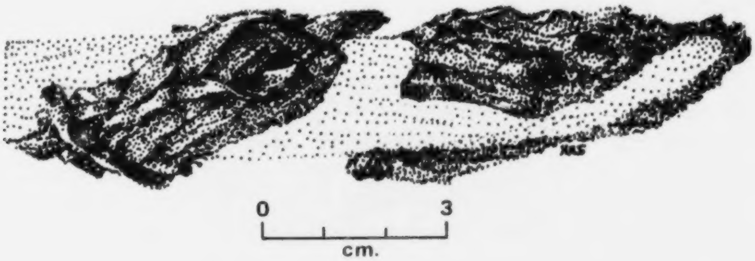

Figure 5-3. Reconstructed bark wrapped pine tool from two samples (M#1518 and M#1505), 45-DO-214.

Pseudotsuga menziesii (Mirb.) Franco (Douglas fir)

Douglas fir is found in 70% of the testing samples and 22% of the material from Feature 5. The wood is found in all zones and features. In three samples, the fir is incompletely charred.

Cut and formed fir wood is part of two bark wrapped objects (M#1495 and M#1504, Figures 5-4 and 5-5). The wood inside M#1495 may consist of more than one object. A loose, cut and beveled piece, 1.2 mm thick and 5 mm wide, was worked free of the wrapping for examination. It may be the top portion of a flat piece solidly cemented in the wrappings by modern preservatives (and perhaps ancient preservatives as well). The removed

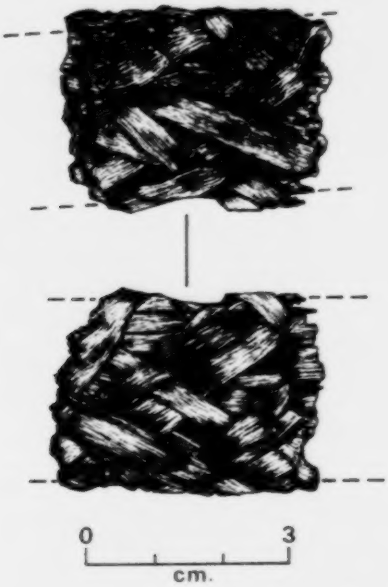

Figure 5-4. Douglas fir artifact with bark wrappings, M#1495, 45-DO-214. Both ends are missing.

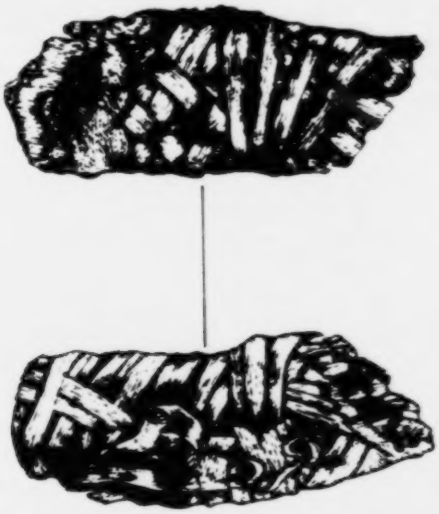

Figure 5-5. Douglas fir artifact with bark wrappings, M#1504 (approximately lifesize), 45-DO-214. One end missing.

piece is approximately 15 mm wide and 1.5 mm thick and has a surviving length of 30 mm. It probably was longer, however, as both ends of the wrappings have been broken. The wood shows collapsed early wood cell walls. Three other fragments found in the same wrapping show marks of artifical cutting or trimming, as well as compression fractures across the broadest part. This indicates that the wood was either in a partial state of decay or, more probably, had been stressed by flexing prior to charring. All pieces of wood in the sample were completely charred. All are from quarter sawn or radially cut lumber, that is, a piece taken parallel to the wood rays.

The second wrapped object (M#1504) contains a curved piece of Douglas fir that has been incompletely charred. One end is completely enclosed by bark wrappings, which are generally finer than those of the above piece. The object is a flat thin piece with two gently rounded edges; it is at least 18 mm wide and 3.5 mm thick in the middle, tapering to 2.5 mm at the edges. The piece comes from a section of wood split tangentially to the rays. The wood is from slow growth stock, and the rings are very close together, which would make the object quite sturdy and tough. The functions of these wooden objects are unknown.

Picea A. Dietr. (spruce)

Three small samples of spruce charcoal were taken from Zone 3 soil near Features A and 5. All are completely charred and are probably from either Engelmann spruce (P. engelmannii) or white spruce (P. glauca). According to Hitchcock, hybridization has occurred between these two species in northeastern Washington, but Engelmann spruce is one most likely in our area (Hitchcock et al. 1969, Vol. I:122-123). Engelmann spruce grows in moist soils in mountainous regions over 920 m. It can be found near swamps and watercourses but is found mostly in rich soils with hemlocks, larches, pines and firs. Spruce wood does not grow near 45-DO-214 at present. It remains to be seen if this species grows anywhere on the Douglas County side of the river. The two species apparently were not differentiated by the Okanogan-Colville peoples (Turner et al. 1980:26), and not much was done with the wood. Ray reports that spruce roots were made into coiled baskets (1932:35) and that spruce bark made serviceable canoes (Post and Commons, in Spier 1938:56).

Other Conifer

A small sample of pine was found in a mixed sample of incompletely charred woods near Feature 5 in Zone 3 (M#1602). The species may be either white bark pine (P. albicaulis) or western white pine (P. monticola). The first is a timberline species, gathered for nuts on the upper reaches of the Twisp River in September, while the latter grows in the Arrow Lakes region (Turner et al. 1980:28-29). The wood does not seem to have been particularly prized in our area. Other pines are more available. It may be a gift of the river.

Other conifer materials from 45-DO-214 include four samples with cone material in Zones 2 and 3, two partial ponderosa pine needles from Zones 2 and 3, and a pine nut hull section from Feature A in Zone 3. The pitchlike or resinous substance found in association with the birch bark may be pine pitch, which was a common adhesive in bindings and hafts (Ray 1932:61,89); Post and Commons, in Spier 1938:53,57).

POACEAE (Gramineae, Grass Family)

Elymus cinereus Scribn. & Merrill (ryegrass, giant ryegrass)

Ryegrass comes from Feature A in Zone 3 and from two carbon samples in soil surrounding Feature 5 in Zone 3. In all three cases the grass is uncharred, although coated with an organic substance different in appearance from that called "pitchlike" or "resinous" elsewhere in this chapter. In two cases, the grass is found with cherry pit fragments and bits of bone, also covered with organic substance. Two samples contain exotic woods such as yew, spruce, yellow and red cedar, and maple in occupational debris.

Ryegrass was an important lining material in pit cooking. It was considered best for this purpose from spring through midsummer (Turner et al. 1980:55). The fact that the grass is associated here with botanical edibles, bone, and other organic substances suggests pit cookery.

POLYGONACEAE (Knotweed or Buckwheat Family)

Polygonum L. (knotweed)

Fragments of one or more knotweed achenes were found in Zone 3 in occupational debris featuring other types of seed coats, a variety of woods, other tissue, and flecks of red pigment. The fragments suggest a small triangular cross section with sides from 0.9 mm to about 1.1 mm and a length of up to 2.0 mm. The coat is dull and charred. While we cannot make a species determination, we are sure it is not the same kind of knotweed found at 45-OK-287/288 (Stenholm 1984); it is a small-seeded form. Although it is edible, its inclusion in the assemblage may be accidental.

ROSACEAE (Rose Family)

Amelanchier alnifolia Nutt. (serviceberry, saskatoon)

A total of 0.01 g of charred serviceberry wood was found in Zone 4 (Flot 25, UL 200). No fruiting material was observed. Serviceberry wood is hard and durable, suited for digging sticks, arrow shafts, seed beater frames, cooking sticks, and the like (Ray 1932:98; Post and Commons, in Spier 1938:58,60).

Crataegus L. (hawthorn, thornberry, haw)

Traces of charred hawthorn wood were found with charred serviceberry wood in Zone 4 (Flot 25, UL 200). Another trace of partially charred wood (M#1602) was found with yew, fir and white pine in Zone 3 in soil surrounding Feature 5. Although no fruiting material was identified, portions of very dense seed coat material resembling that of haw pits were found in Zone 3 near Feature A (Flot 14). Although thorns would make collecting branches for firewood difficult, the wood reportedly was used for digging sticks and other small implements (Turner et al. 1980:125).

Holodiscus discolor (Pursh) Maxim. (oceanspray, arrow wood)

Three examples of charred oceanspray were taken from Zones 2 and 3. Those from Zone 3 are from Features A and 5. The sample from Feature 5 has been cut and smoothed to form a piece weighing 2.9 g, nearly trapezoidal in cross section, 1.5 cm broad, and nearly 1.0 cm wide. Two adjacent sides show smoothing. The piece has been cut from a five to seven-year-old oceanspray cane, split down the middle and finished. Originally, it was probably much longer than its present 1 cm. It may also have been wider.

Oceanspray has not been observed within easy walking distance of the site. It is a mountainous rather than terrace species, generally growing above 750 m on the Okanogan County side of the reservoir. It requires shade and is generally part of the understory in mixed coniferous forest in our area. It is found with plants such as buckbrush (Ceanothus), Soapberry (Shepherdia), kinnikinnick (Arctostaphylos), and huckleberry (Ribes).

Oceanspray was an important wood used for a variety of implements including digging sticks, arrow shafts, drum hoops, cradle covers, and other items (Turner et al. 1980:126). Plain or recurved bows and sinew-backed bows were made from it (Ray 1932:87-88).

Prunus virginiana L. (chokecherry)

Two nearly entire chokecherry pits with partial flesh were found in Zone 3 near Feature 5. Both are completely carbonized. One (Plate 5-3) comes from a sample from UL 90 (M#1606) that also contains grass with organic material adhering. The other from UL 100 in the same quadrant (M#1607), also was found with organic encrusted ryegrass and woods not native to the immediate area -- maple, spruce, two cedars, and yew.

According to Post (in Spier 1938:28), chokecherry fruits were gathered in mid-August and often were treated like serviceberries, dried on mats and stored whole. Alternately, they could be pounded with salmon by-products such as heads, tails, or eggs. Ray notes that cherries were used fresh and that unseeded, mashed fruits were mixed with pulverized, dried salmon and stored (1932:101). Turner reports similar treatment, except that she does not mention seed removal (Turner et al. 1980:127-128).

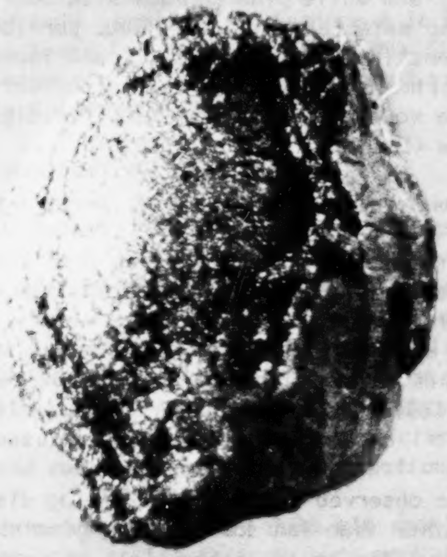

Plate 5-3. Chokecherry pit with charred flesh (M#1606), 45-DO-214. Length 0.7 mm.

Whole pits suggest fresh fruits eaten out of hand. The discovery of two with bits of flesh still adherent strengthens the suggestion. Bushes dot protected parts of the terrace and hillsides and draws. In this region the fruits change color during the last of July and the first part of August. In the last two years, cherries have ripened in the last week of August. This year (1982) the harvest will be a few days earlier.

Purshia tridentata (Pursh) DC. (bitterbrush, greasewood)

Bitterbrush charcoal (0.11 g) appears in four samples in Zones 1, 2, and 3. Three of these are from flots (9,12, 14) and one is from unit 50N26E in a sample (M#1605) with other burnt wood. All of the bitterbrush is completely charred. The bitterbrush from one of the flots in or near Feature A consists of twigs and branches. This suggests that bitterbrush wood was used as fuel but was not a very important one. Three charred bitterbrush achenes from the same flots and one from Flot 16 may have been introduced to the site along with the wood.

Serviceberry/Hawthorn (Serv/Haw) and remaining Rosaceae

The remaining woods constitute a total of 0.06 g. The serv/haw wood is from Flots 8, 10, 11, 13, and 41 in Zones 1, 2, 3 and weighs 0.05 g. All of it is charred. The category Rosaceae includes serviceberry, hawthorn, bitterbrush and perhaps others of the family. Pieces are too small to identify further. Together, five flot samples (8, 16, 19, 20, and 24) contribute only 0.01 g. This is distributed among Zones 1, 3, and 4.

Other Hardwoods

A trace of hardwood with pore clusters was taken from Zone 2 (Flot 11), and another trace of diffuse charcoal that may belong to willow or aspen genera (Salix, Populus) was found in debris from Feature A (Flot 14).

TAXACEAE (Yew Family)

Taxus brevifolia Nutt. (yew)

Yew is found in Zones 3 and 4 but is concentrated in Zone 3 from UL 80 to UL 120. More than 4.7 g of the charred and incompletely carbonized wood was recovered from 11 samples (20% of the total). It is found in Flots 13, 16, 17, and 23 in radiocarbon samples 31, and 32, and in miscellaneous carbon samples from soil surrounding Feature 5 (M#1602, 1605, 1607 and 1609). In addition, a small amount of charred yew was taken from Zone 4, UL 180.

Yew does not grow near the site, nor does it occur on the Douglas County side of the river. It prefers moist forest soil and is most likely to be found as single trees on watered flats along streams, much the same habitat as that preferred by yellow cedar in the wet belt of the Selkirk mountains, Canada (Turner 1979:116-117). Trees are small, even shrub-like, with bole diameters hardly exceeding 30 cm. The wood possesses exceptional bending strength, hardness, and decay resistance (Panshin and DeZeeu 1970:Table 11-2). The native name for the wood refers to past usage as bow material (Turner et al. 1980:35). The only specific use for the wood mentioned in the ethnographic literature, however, seems to be as a red vegetable dye with fish oil base (Ray 1932:52) or skin salve (Turner et al. 1980:35). Wood may have floated down from Canada as drift. It is more likely, however, that our pieces represent material traded from the north or west (Turner 1979:116-117).

UNIDENTIFIED SEEDS

Unidentified seed fragments fall into three descriptive categories: (1) spongy, having a cell structure that would give the coat a leathery texture, (2) dense, having a hard, tough texture, and (3) other, a residual category. Bitterbrush and pine seed walls provide an example of spongy texture. Flot 13 from Zone 3 contains a fragment of such a seed wall. It may well be from a bitterbrush achene, as achenes were found in the unit level above and below this one. Examples of dense seed coats occur in Flots 10, 12, 13, and 14 in Zones 1, 2, and 3. All occur in flots that appear to represent occupational debris. The small piece from Flot 14 has surface features which resemble those of rose or hawthorn pits, but identification is far from certain. Other seed fragments consist of a partial seed embryo that resembles that of bitterbrush in shape and size. It is from Flot 10 in Zone 1. The flot directly above it contains both bitterbrush wood and an achene fragment.

LEAF AND STEM TISSUE

Leaf tissue was recovered from Flots 9, 12, and 15 in Zones 1, 2, and 3. Two of the samples are from small leaves that have cuneate or wedge shaped bases and inrolled margins and are pilose hairy on the underside between the veins. All three weigh less than 0.01 g.

Herbaceous stem tissue is found in Flots 10, 11, 14, 15, and 19 in Zones 1, 2, and 3 and weighs about 0.01 g. Flots 13 and 15 in Zones 2 and 3 show traces of hardwood bark. The amount is too small to identify further. Flots 16 and 10, from Zones 3 and 2 respectively, contain rootlike material in occupational debris. The Zone 2 material, (0.01 g) probably is Lomatium. The Flot 16 material, from debris associated with Feature A, seems to be storage tissue of some kind, but the small amount precludes further analysis. Finally, bits of charred plant tissue too small to identify further occur in all flot samples except 7 and 8. These materials weigh 0.06 g and consist of portions of outer tissue (epithelioid) and inner plant tissue (parenchymoid), and others that cannot be placed.

SUMMARY BY ZONE

Botanical materials from 45-DO-214 are summarized below by analytic zone. The discussion begins with the oldest zone.

ZONE 4

Zone 4 is represented by five flots (21-25) from testing unit 50N27E. Slightly more than 0.05 g of archaeological carbon was extracted from 1,573 g of soil for a zonal carbon:noncarbon average of only 0.006% and purity ratings that range from 13% to 67%. Most of the noncarbon material in the samples consist of tiny modern rootlets and shell fragments. The oldest archaeobotanical materials at the site consist of charred Douglas fir, conifer, serviceberry, hawthorn, and bits of herbaceous tissue from UL 100. All samples contain conifer wood. Four of the five samples contain Douglas fir; yellow pines appear in three, and yew in one. Three of the flots also contain rose family members. Serviceberry appears in two, hawthorn in two, and an unidentified rose family member in one. All samples contain bits of herbaceous stem tissue.

The sample showing the greatest amount of material, Flot 23 in UL 180, may represent occupational debris. It has a carbon ratio of 0.02%. The low (37%) purity ratio reflects, in part, a number of shell fragments. The botanical material consists of all of the yew wood, serviceberry and hawthorn, herbaceous material, and bits of material that may be either plant pitch or other organic residue. This last material, incidentally, looks similar to organic residue found in Features 5 and A in Zone 3.

ZONE 3

Zone 3 is represented by eight flotation samples (14-20, and 41), seven carbon samples (RC 29-32, 35-36, and 49) from testing unit 50N27E as well as 27 botanical samples pertaining to Feature 5 from unit 50N26E. The testing material consists of 22.85 g of carbonized and partially carbonized material, while the salvage samples consist of 31.13 g of carbonized, partially carbonized, and uncarbonized material. Wooden artifacts wrapped in birch bark are found in these samples. Flotation remains from Zone 3, including those from Feature A, total 0.32 g. The entire assemblage consists of 75% conifer, 10% hardwood, 1% edible material, and 14% other tissue.

Unit Level Material from Testing Unit

Five flotation samples (16, 17, 18, 19, 20) from Unit Levels 110 to 150 (Table 5-1) yielded 0.11 g of botanical materials from 192 g of soil for a carbon:noncarbon zone average of 2.4%. Purity ratings range from a high of 60% near the top of the zone to less than 1% at the bottom. Ratings are fairly low in Unit Levels 110, 120, and 130, largely because numerous calcined bone and shell fragments and some lithic materials are present. The amount of bone, shell, and lithic material in Flot 16, for instance, equals the weight of the botanical material (0.04 g each in a 0.10 g subsample). The sample, then, contains 80% cultural material, only half of which is carbonaceous.

The carbonaceous assemblage consists of 69% coniferous material, less than 1% hardwood, no floral edibles, and 31% other tissue. One sample of Douglas fir is incompletely charred. The remaining tissues appear completely carbonized. Pines are found in all samples. Douglas fir is found in three, and cypress family members are also found in three samples. Yew is present in two flots on the same level as Feature A.

Although no edible material has been identified, organic material of some kind is present in the lower part of the zone. The amount of burned or calcined bone and shell in the first three flots indicates that some faunal edible material must have been present.

Feature Materials

Feature A materials come from Flots 14, 15 and 41, as well as carbon samples (29-32, 35-36 and 49). These are shown in Table 5-2. Incompletely carbonized woods and other botanical materials are shown with an asterisk. Nearly all of these materials are from carbon samples associated with Feature

A. All of the ponderosa pine, however, and some of the fir and yew is from the northeastern quad. The only uncarbonized material under Feature A is Douglas fir from level 130.

The three flots consist of 79% conifer, 16% hardwood, 5% edible tissues, and less than 1% other. The percentage of "other" at 45-DO-214 seems very low. This may be a consequence of the sample size which is too small to produce reliable percentages. The cypress family, Douglas fir, and some pine and the rose family are represented in Feature A. Since fir appears as incompletely carbonized in some samples, while members of Rosaceae never do, fir may have been used both as fuel and building material.

Data Recovery Material

Twenty-seven samples (41.13 g) were taken from the top portion of Zone 3 in unit 50N26E (Table 5-3 and Appendix D). One sample (CS36) contained residue-stained sand. The remaining samples consisted of birch bark, Indian hemp, ryegrass, and woods in various stages of decomposition and charring. The woods, hemp, ryegrass and birch bark have parallels in Zone 3 testing materials. Appendix D gives a complete description of all samples by depth, quad, and condition. Feature 5 samples are treated separately from unit level materials in the northwest, southwest and southeastern quadrants. Unit level materials share many woods and other materials in common with Feature 5, on the one hand, and Feature A and its unit level materials on the other.

Feature 5

Feature 5, a concentration of bone, stone and botanical artifacts, was found in the northwest quadrant of 50N26E at about the same stratigraphic level as Feature A in 50N27E. Feature 5 includes 13 samples of botanical material, with a total weight of 26.62 g, distributed in levels 100 and 110. The samples consisted of seven shaped objects made of four woods (Douglas fir, ponderosa pine, mock orange, and oceanspray). Five (M#1601, 1495, 1504, 1505, and 1518) have birch or other bark wrappings. Two of these, M#1505 and M#1518, are believed to be part of the same broken and partially charred, knifelike tool. Fragment M#1505 was found with 1.33 grams of an organic substance (M#1608) thought to be cured leather. The wrappings on all the tools were made in the same manner (see discussion under Betula occidentalis [Western birch] in the assemblage description). In most cases we cannot determine if the wrappings were meant to enclose the wood objects permanently. The haft wrapping (M#1601) leaves no doubt about its function; it was not treated with modern preservatives, yet the layers are solidly cemented together. Because the other constructions have been permeated with preservative, we cannot determine if they were cemented originally.

The collapsed and compressed state of the cells of the pine and fir tools under the wrappings suggests they were stressed by a great weight (possibly foot pressure) applied to their flat sides. That the cells are collapsed in two different woods (pine and fir) and bending stresses are evident in at least three different pieces, suggests that some decomposition occurred in the ground and not as a result of tool use. Portions of the wood and bark may have been charred after the decomposition was underway. In short, once the tools were deposited, their location was forgotten or they were considered unimportant. This helps to explain the fragmentary nature of the birch bark, 4.13 g of which is in loose and broken pieces.

Table 5-3. Botanical assemblage of Feature 5 and surrounding soil, 50N26E, 45-DO-214.

Identifiable Botanical Material	Feature 5		Surrounding Area	
	g	#	g	#
Conifer				
Ponderosa pine	NA**	1	0.20	2
Yellow pine	0.06	3	-0.01*	1
Soft pine			0.17*	2
Douglas fir	+0.05**	4	0.23*	2
Spruce			1.70	2
Yew			3.93*	4
Yellow cedar			1.71*	2
Red cedar			4.78*	4
Cone			0.02	1
Bark				
Other conifer			-0.01	1
Hardwood				
Bitterbrush			0.07	1
Hawthorn			-0.01*	1
Oceanspray	2.90	1		
Mock orange	0.03	1		
Maple			0.04	1
Birch bark	23.34*	11	1.55*	6
Other hardwood			0.01	1
Edibles and Other Tissue				
Cherry pits and flesh			0.07	2
Grass and fibers	0.23*	4	0.03*	2
Pitch or resin	0.01	8		
TOTAL	26.62		14.51	

* Partially carbonized material present.

** The specimen of ponderosa pine and two of Douglas fir could not be weighed because they were cemented inside bark wrappings.

Other material from Feature 5 consists of two small masses of Indian hemp fibers (M#1520 and 1504) soaked in pitch or other organic residue and attached to birch bark in such a way as to appear accidental. That is, the fibers occur on the outside of a completed wrapping; they are not oriented to any of the bark axes, and occupy a tiny area only. A fibrous material that may be hemp clings or is glued to the interior of the bark haft wrapping, and one thin strand is glued to the underside of a bark strip (M#1493). Bits of pitch or resin are found in eight of the samples, mostly in association with birch bark. Pitch or resin is often found on the surfaces of the woven constructions; presumably, it forms some of the cement that holds the layers together.

The remaining material consists of loose birch bark strips (M#1516, M#1575, and M#1576), samples of loose and adherent bark broken from constructions (M#1566, 1516, and 1493), and loose birch bark with other materials (M#1520). None of the birch bark from the feature appears completely carbonized. All the samples contain some uncarbonized or partially carbonized material. The weight of the bark shown in Table 5-3 is only an approximation. It does not take into account pitch, preservative, or adherent wood.

Unit Level Materials

Five samples were examined from levels 100-120 in the northwest quadrant of 50N27E, outside of Feature 5. Two contained carbonized bark (M#1433 and M#1441), and two contained noncarbonized and incompletely carbonized bark (M#1603, M#1436). The last sample (M#1602) contained incompletely carbonized western white pine, Douglas fir, yew, and hawthorn wood, along with fish vertebrae and other fish bone and organic residue.

Six samples from levels 90 and 100 in the southwestern quadrant were examined. Two (M#1606 and M#1607) contained charred chokecherry pits and ryegrass fragments with organic residue adherent. One of the samples from UL 100 also contained yew, red and yellow cedar, spruce and maple charcoal along with bone and lithic material covered in organic residue. Sample CS36 comes from this quad; it is highly unusual in that it contains fragments of birch bark, flecks of charcoal, and quartzite sand particles coated with organic residue. Most of these materials are found in or near Features 5 and A.

Only three samples were taken from the southeastern quadrant (levels 80 to 110). Materials consist of an uncharred cedar spatulate tool (M#1604) and two samples containing incompletely charred red cedar, yellow pine, Douglas fir, yew, bitterbrush (charred), yellow cedar and birch bark. One sample also contains bone (M#1605).

In sum, the unit level materials contain the same woods and fibers found in Feature 5 and Feature A. Edible material products such as cherry, fish, and other faunal remains, including possible organic residue other than pitch, tie 50N26E salvage unit level materials closely to unit level materials from testing unit 50N27E. The state of preservation (charred vs incompletely charred or uncharred) shown in Tables 5-2 and 5-3 also links the features and their associated unit level materials.

ZONE 2

Zone 2 contains materials weighing 0.10 g from Flots 11, 12, 13 (levels 60, 70, 80). The botanical material was recovered from 96 g of soil for a zone average of 2.6% carbon; carbon purity ranges from 20% to 60%. The zone exhibits a steady rise of both archaeological carbon and carbon purity from top to bottom, foreshadowing the situation in Zone 3. Flot 13 (UL 80), for instance, has items which are also found in Features A and 5 (see Chapter 6), such as yew wood, flecks of red pigment, and trimming flakes. Flot 12 (UL 70) has oceanspray wood, possible Elymus culm fragments, and pine needle fragments. Both contain dense seed coat fragments similar to those of economically important species such as cherry or haw. Percentages of materials approach those from Zone 3 unit level material as well.

Zonal materials include 0.04 g (36%) of conifer charcoal, 0.05 g (46%) of hardwood charcoal, <0.01 g (<1%) edibles, and 18% other tissue. Conifer charcoal consists each of yellow pine, Douglas fir, yew, and cypress family members, totaling 0.04 g. Yellow pine, fir, and cypress charcoal appear in every flot. A charred, three-sided needle from Flot 12 indicates that some of the yellow pine is ponderosa. Hardwood charcoal consists of serviceberry/hawthorn in Flots 10 and 13, bitterbrush wood and seed in Flot 12, and a trace of oceanspray in Flot 12. We find traces of grass culm, probably ryegrass fragments (Elymus), and traces of dicot leaf tissue in Flot 12. Bits of bark (family unknown) and of herbaceous tissue appear in all three flots.

ZONE 1

Zone 1 is represented by four flots (7, 8, 9, and 10) from levels 20-50 of testing unit 50N27E. A little over 0.04 g of material was extracted from 66 g of soil, for a zonal carbon:noncarbon ratio of 1.0%. Biological contamination is severe, and purity ratings range from <1% to a high of 20%. Contamination products consist of modern seeds (most commonly, bitterbrush and knotweed), leaves, stem parts, and insect remains.

Conifer charcoal accounts for half of the remains. Cone and bark material of Douglas fir, ponderosa pine, and yellow pine appear in Flots 7 and 10. Cypress family members, including red cedar and perhaps others, appear in Flots 9 and 10. Hardwood charcoal, bark and seed fragments appear in Flots 8, 9 and 10. Bitterbrush wood appears with an achene fragment in Flot 10, serviceberry/hawthorn charcoal appears with a dense seed coat fragment in Flot 10, and rosaceous wood appears in Flot 8. The remaining tissue consists of root believed to be Lomatium sp., and an embryo fragment that may belong to bitterbrush, all from Flot 10. Finally, a small amount of herbaceous stem material was found in Flots 9 and 10.

Flot 10 from UL 50, contains 50% (0.02 g) of the zone material. It contains all of the root material, dense seed coat and embryo fragments, conifer cone material, some of the Douglas fir, yellow pine, and cypress charcoal. Although indicative of occupation debris, it is thoroughly contaminated with modern material, including remains from an ant nest. Because Flot 10 is at the boundary of Zones 1 and 2, some of this material may have permeated other layers or have come from other layers.

6. FEATURES ANALYSIS

During excavations at 45-DO-214, ten cultural features were recorded. In the course of laboratory analysis, ten additional features were defined. The procedures and rationale of feature identification are discussed in detail in the research design (Campbell 1984d).

These 20 cultural features were classified according to a two-tiered paradigmatic system (described in Campbell 1984d) which considers, on one level, feature boundaries, provenience, shape, and patterning, and on the second level, material contents. By combining this information with information such as size or actual material counts, we can classify the features into functional types. At 45-DO-214, we find two basic types of features; firepits and layers of cultural debris representing either broad cultural strata or actual activity surfaces. These categories may be further subdivided. "Firepits" includes actual pits (firepits, roasting pits, and earth ovens) and surface fire hearths. The concentrations of debris can be characterized as rock, rock and bone, or rock and shell concentrations. These functional types serve as the referent for our discussion of features at 45-DO-214. Field-assigned feature numbers are referred to parenthetically for readers who wish to research further. Table 6-1 lists these feature types by zone, gives the area from which the features were collected, and their contents. For Features 1-10, the area measurement is equal to actual feature dimensions, but for Features 12-20, this measurement only reflects the number of 100 x 100-cm squares in which that feature was found. Since these features were defined during analysis, it is not possible to segregate material from the feature itself.

The cultural features at 45-DO-214 occur in all four analytic zones. The distribution of features by zone is summarized in Table 6-1. Each zone is discussed below.

ZONE 4

Zone 4, representing the earliest use of the site, from 4000 to 2000 B.P., contains four concentrations of rock and shell (Figure 6-1). Each differs slightly from the others in thickness, amount of charcoal staining, and artifact assemblages. Shell dominates all four, however; gathering and processing of shellfish appears to have been the primary focus of activity. Though badly eroded, at least two of the concentrations show evidence of being firepits or surface hearths.

Table 6-1. Zone summary: Features by type, dimensions, depth, and contents by counts and weights, 45-DO-214[1].

Feature #	Feature Type	Collection Area (cm)	Total Depth (cm)	FMR	Shell		Salmon Bone	Other Bone		Formed Objects	Debitage
				#	g	#	#	g	#	#	#
Zone 4											
4	Shell and Rock Concentration	100 x 55	13	–	60	12	–	–	–	1	–
15	Shell and Rock Concentration	400 x 100	20	9	6827	2323	–	18	82	9	44
17	Shell and Rock Concentration	200 x 200	30	137	2906	520	–	248	520	32	133
19	Shell and Rock Concentration	200 x 100	30	19	604	365	–	35	140	6	51
Zone 3											
5	Artifact Cache	50 x 50	13	–	–	–	–	93	50	76	30
6	Bone and Rock Concentration	65 x 70	9	2	1	1	–	489	459	2	3
3	Firepit	25 x 35	23	–	–	–	–	–	–	–	–
2	Rock Concentration	50 x 50	10	–	–	–	–	–	–	–	–
8	Surface Hearth	100 x 100	14	68	–	–	160	129	369	2	14
13	Bone and Rock Concentration	100 x 100	10	19	–	–	–	382	788	2	22
14	Bone and Rock Concentration	100 x 100	20	3	3	1	3	560	896	7	60
Zone 2											
7	Firepit	100 x 75	16	84	10	21	–	34	116	4	18
9	Earth Oven	80-cm diameter	31	257	–	–	–	25	165	1	3
16	Bone and Rock Concentration	300 x 200	20	252	6	2	7	404+	1358	65	645
Zone 1											
1	Surface Hearth	40 x 30	13	12	–	–	–	–	–	–	–
12	Surface Hearth	100 x 100	14	19	2	2	–	34	169	–	27
10	Firepit	55-cm diameter	20	5	–	–	–	1	6	–	–
18	Rock Concentration	100 x 200	20	18	–	–	–	1	1	–	7
20	Bone and Rock Concentration	200 x 100	20	89	–	–	–	75	337	8	51
11	Petroglyph[2]	8 x 10									

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[1] Features 12-20 were defined during analysis. Material counts are from the entire square(s) in which the feature occurs.

[2] Feature 11 is a petroglyph of uncertain provenience. It is not assigned to a zone.

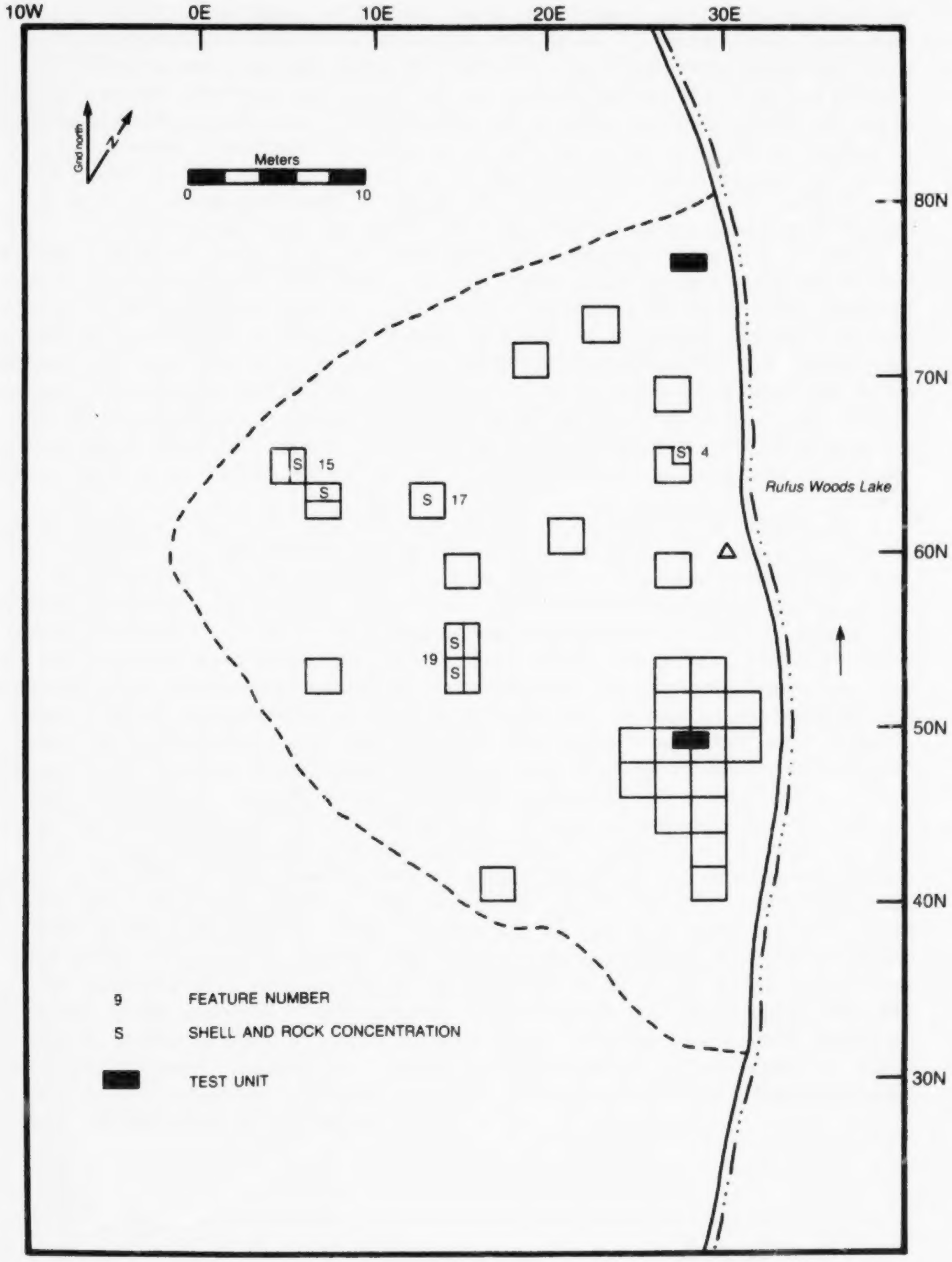

10W
0E
10E
20E
30E
Gnd north
N
Meters
0
10
80N
70N
60N
50N
40N
30N
15
17
19
4
S
Rufus Woods Lake
9 FEATURE NUMBER
S SHELL AND ROCK CONCENTRATION
TEST UNIT

Figure 6-1. Location of features, Zone 4, 45-DO-214.

The first concentration (Feature 4, 66N27E, Level 220) consists of two small areas of charcoal staining, five unmodified rocks, and a hammerstone, all incorporated into a matrix of black magnetite beach sand. Sloping under Feature 4 is a scatter of freshwater mussels, most still articulated, found 1 m to its west. Both the shell and the artifacts lay upon the original cobble beach surface. This concentration may be the oldest cultural feature at the site, a hearth area used during the processing of shellfish. Given the lack of extensive charcoal and the intact character of the shell, however, this could equally well be a natural feature--its hearth-like appearance could result from the localizing black sand deposit. Yet, the presence of a hammerstone and limited carbon staining argue for a cultural origin.

The second shell concentration (Feature 15) is a layer of debris spread over a relatively large area (260 x 80 cm). The only feature exposed in two discontiguous units at this site (Figure 6-2), it was noted in 66N5E, 65N5E, and the northern sections of 64N6E and 64N7E (Levels 90-100). It consists of a large number of freshwater mussel shells associated with a few fire-modified rocks and bone fragments (Table 6-1). The mussel shells include many isolated single valves, indicating a cultural origin. Associated with the shell are three bifaces, two tabular knives, an adze-like object and three indeterminate tools. We may reasonably infer that this feature represents a food-processing area.

The shell concentration in 64N12E (Levels 120-170, Feature 17) is a layer of shell and rock approximately 30 cm thick that slopes 50 cm from west to east across the 2-m^2 unit. It may either represent a shell midden or an accumulation of occupation surfaces. While the soil is only slightly stained, the debris is concentrated--counts are especially high for lithic debitage, bone fragments, and shell (Table 6-1). Of the 76 identified bones, five are deer and one is deer-sized; the rest are from various kinds of rodents. The tool assemblage is varied: two projectile points, ten tabular knives, three bifaces, four utilized flakes, one linear flake, four unifacially retouched flakes, one hammerstone, one core and six indeterminate bone or stone objects.

The last shell concentration (Feature 19, 55-56N14E, Levels 130-150, 55-56N15E, Levels 150-160) is similar to the third. It is a sloping stratum of debris. Granite and basalt rocks, and mussel shell fragments, were found closely associated in the upper levels on the western side of the unit; toward the east, these materials thinned out and were mingled with more bone and lithic debris. The plan map of the unit (Figure 6-3) suggests one or two hearth areas within the rock concentrations. On the other hand, since very little rock shows any sign of fire modification and charcoal staining is limited, these areas may be fortuitous alignments. Fifty-one waste flakes were recovered from the unit, along with a biface, a tabular knife, a utilized flake, a resharpening flake, and two pieces of siltstone. None of the bone is identified.

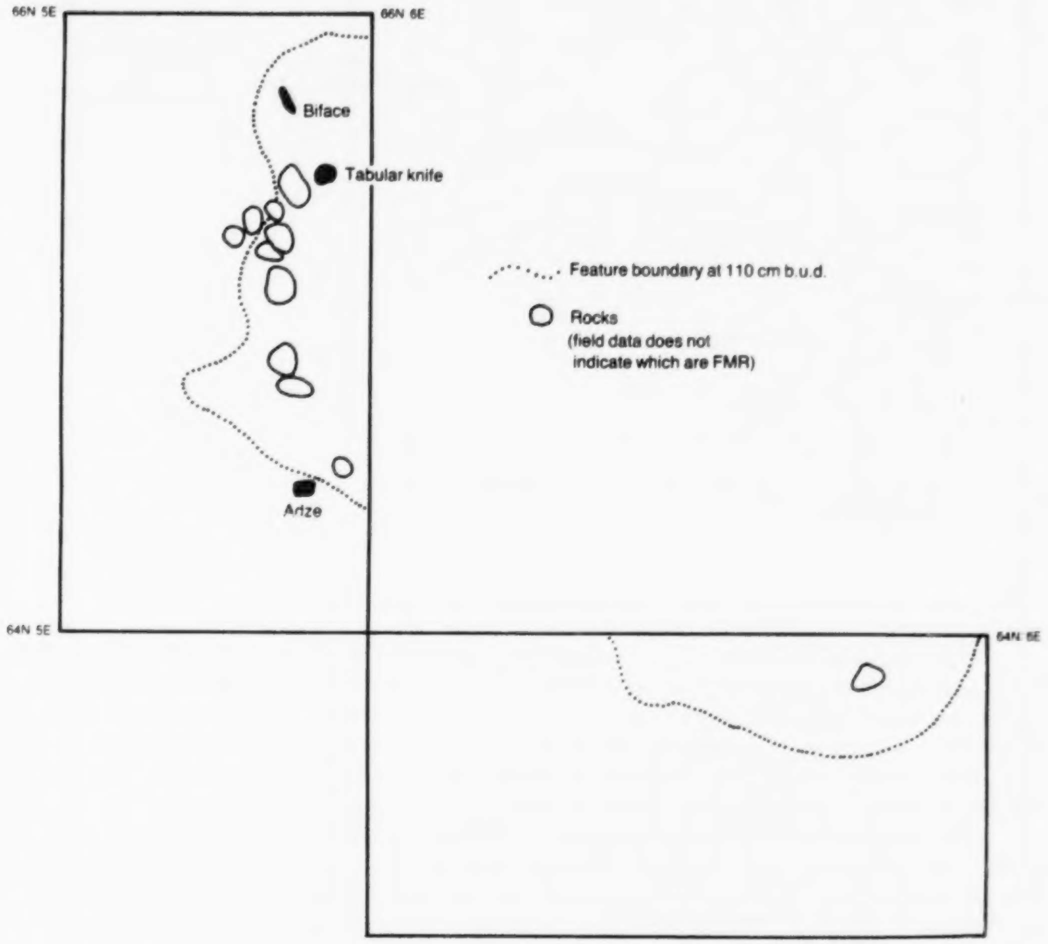

66N 5E
66N 6E
Biface
Tabular knife
Adze
64N 5E
64N 6E
Feature boundary at 110 cm b.u.d.
Rocks
(field data does not indicate which are FMR)

Figure 6-2. Shell concentration (Feature 15), Zone 4, 45-DO-214. Feature boundary indicates extent of shell.

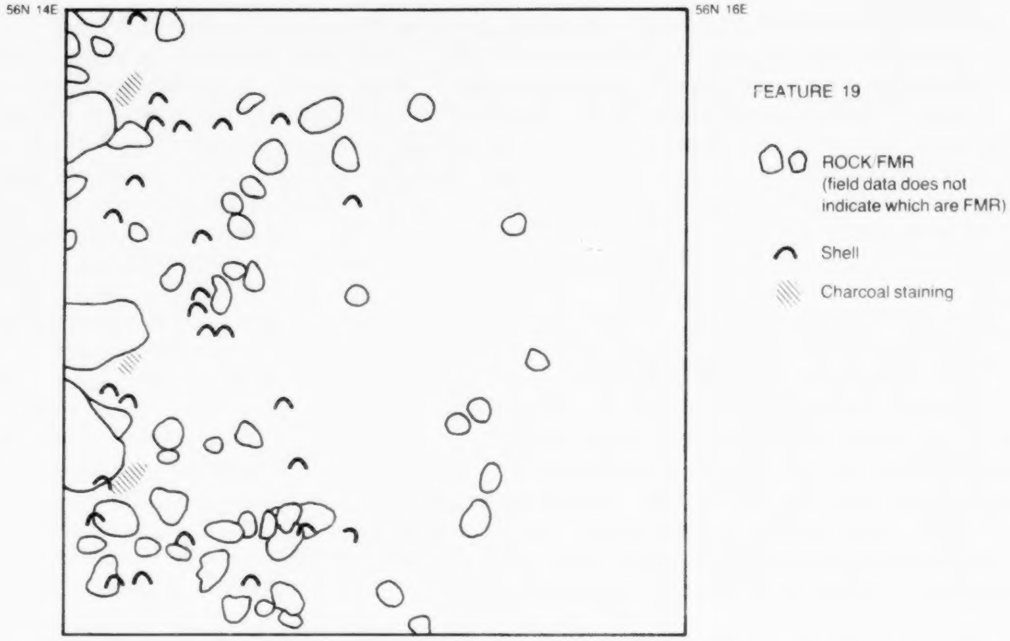


Figure 6-3. Plan map of shell concentration in Zone 4 (Feature 19), 45-DO-214.

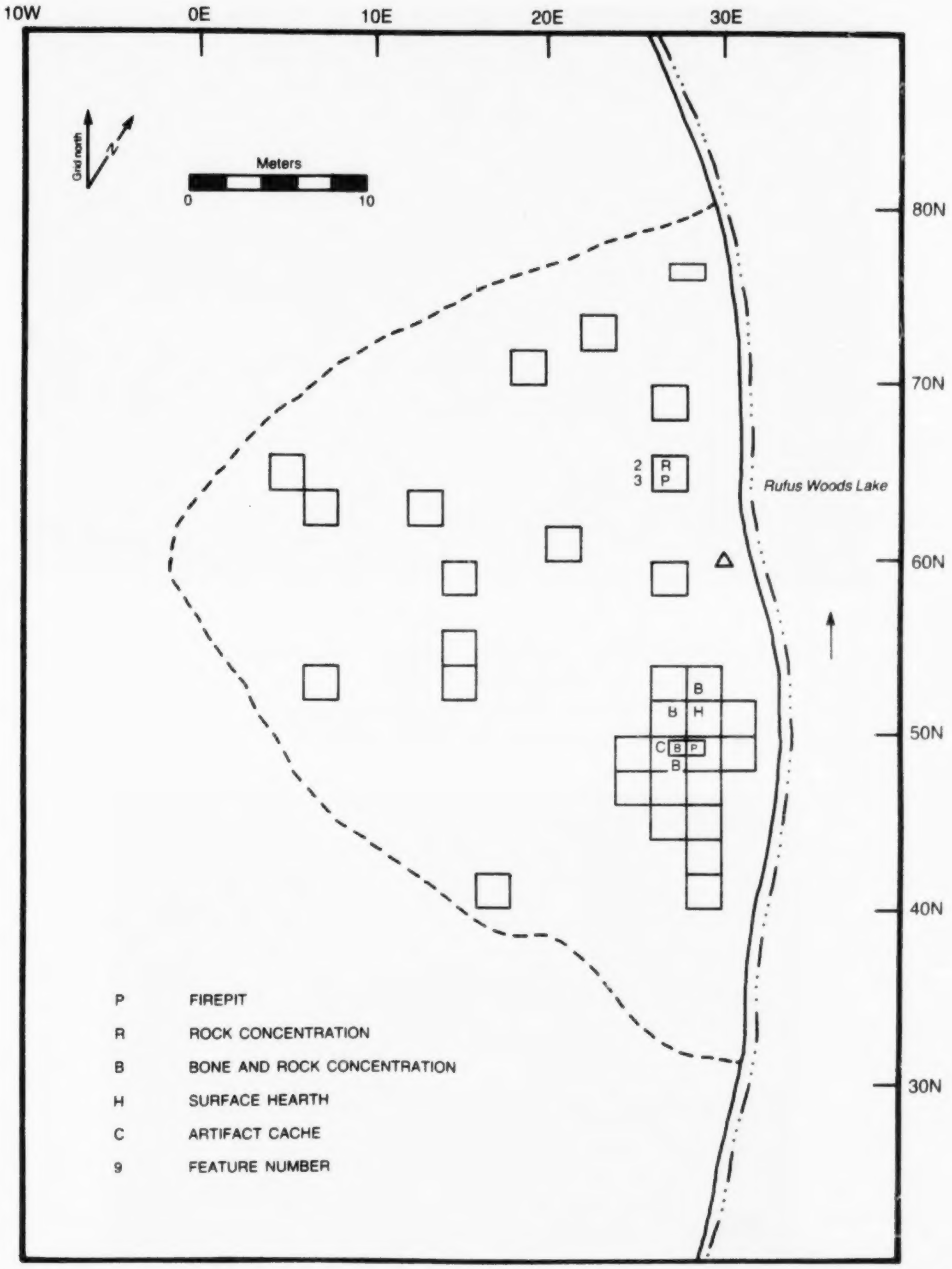
ZONE 3

The features of Zone 3, representing use of the site from 1200-1000 B.P., indicate a shift in site function from Zone 4. None of the features contain shell in quantity, and pits (mostly cooking pits) appear for the first time. A cache of artifacts, probably associated with an area of intense carbon staining uncovered during testing in 1978, two firepits, and several use surfaces occur in this zone (Figure 6-4).

The cache of artifacts (Feature 5, 50N26E, Levels 100-110) lies in a small (50 cm diameter), shallow (13 cm) depression (Plate 6-1). Stained soil and some charcoal is in evidence; most of the artifacts are burned. We have no reason to believe the cache is a secondary deposit, and assume it was burned **in situ.**

Most of the objects in the cache are manufactured bone objects, and many more are unidentifiable bone fragments. Table 6-2 lists the types of objects in the cache. Although some of the bone artifacts are clearly fishing tackle, others are multipurpose tools that cannot be definitely linked with any one activity.

Just east of the cache are a small, carbon-filled pit (Testing Feature A) and an irregularly-shaped area of charcoal staining (Testing Feature B). These two features (Figure 6-5) were uncovered in a test unit dug in 50N27E and 50N28E. The firepit, approximately 40 cm in diameter and 20 cm deep (95-


10W
0E
10E
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30E
Grid north
N
Meters
0
10
80N
70N
60N
50N
40N
30N
Rufus Woods Lake
2 R
3 P
B
B H
C B P
B
P FIREPIT
R ROCK CONCENTRATION
B BONE AND ROCK CONCENTRATION
H SURFACE HEARTH
C ARTIFACT CACHE
9 FEATURE NUMBER

Figure 6-4. Location of features, Zone 3, 45-DO-214. Feature numbers within the block excavation are shown in Figure 6-8a.

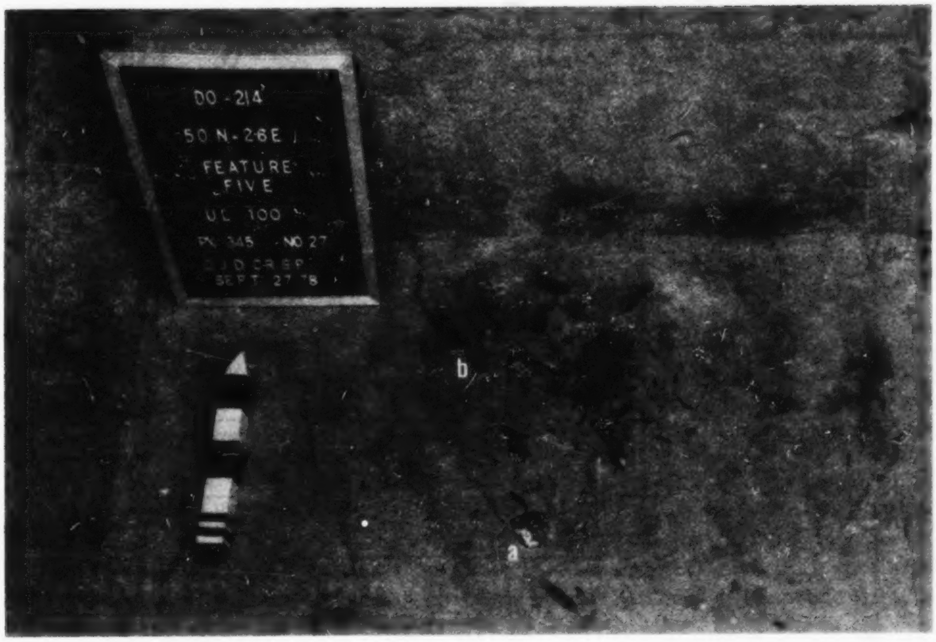

DO-214
50 N-26E
FEATURE
FIVE
UL 100
PV 345 NO 27
SEPT 27 78
b
a

Plate 6-1. Artifact cache, Feature 5,
Zone 3, 45-DO-214.
A. Cryptocrystalline Scraper.
B. Incised Carving Tool Handle.

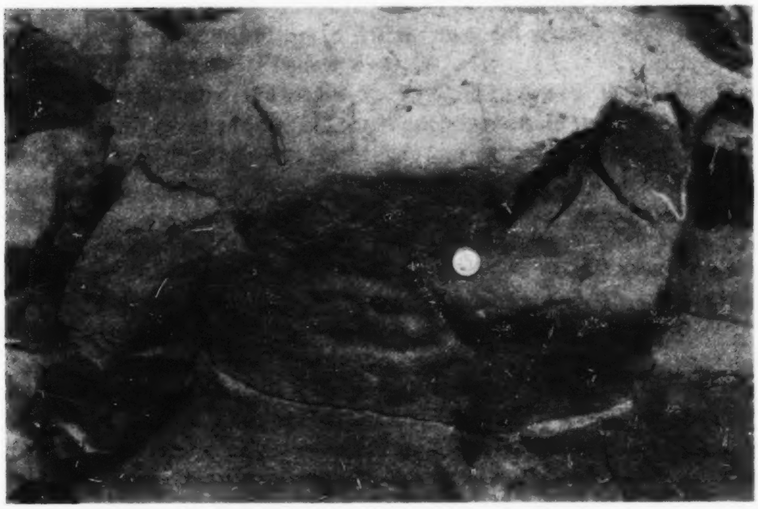


Plate 6-2. Petroglyph, Feature 11, 45-DO-214.

Table 6-2. Contents of Feature 5, 45-DO-214.

Bone Artifacts		N
Harpoon valves		3
Valved unipoint		1
Unipoint		2
Round section bi-point		4
Flat section point		1
Handle		1
Bead		5
Proximal end, metapodial		3
Pointed end fragment		3
Squared end fragment		2
Blunted end fragment		2
Shaft fragments		2
Technologically modified fragments		15
Other fragments		2
Utilized fragments		2
Subtotal		48
Identifiable Bone		
Castor	Molars	3
	Incisor	1
Cervid Od.	Antler Fragments	4
Deer-Sized	Thoracic Centrum fragments	1
Subtotal		9
Unidentifiable Bone Fragments		31
Woven, Wood, Leather		7
Lithic Artifacts		
Bifaces		3
Scraper		1
Abraders		5
Unifacially retouched flakes		2
Utilized flakes		12
Pipe bowl fragment		1
Core		1
Unmodified flakes		3
Subtotal		28
TOTAL		123

115 cm b.u.d.), is 20 cm east of the cache, and apparently associated with it. The surface scatter, 100 by 50 cm, contains fire-modified rock and burnt soil. Field notes make it clear that burnt fish and mammal bone were abundant in both features, but because of differences in analyses, their material contents have not been tabulated here.

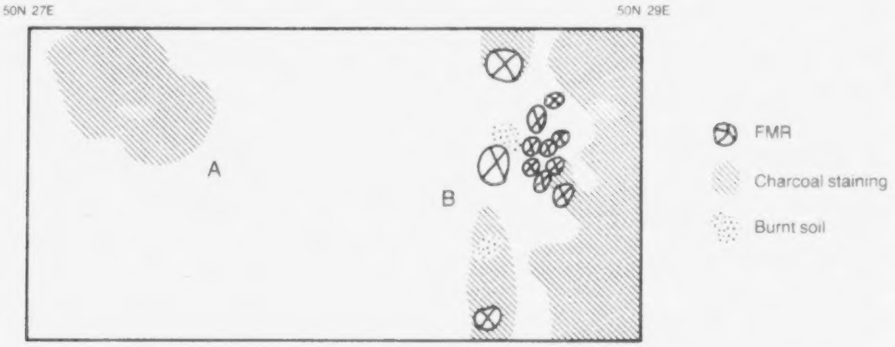


Figure 6-5. Testing Features A and B, Zone 3, Levels 100 and 110, 45-DO-214.

A third feature, possibly associated with the artifact cache and the two testing features, occurs in 49N27E (Level 110, Feature 6). This large concentration of bone fragments and other debris, measuring 100 x 75 x 9 cm, appears to represent a single activity. Although other material classes are also represented (Table 6-1), the major constituent is bone. Most of the four hundred and fifty-nine bone fragments collected were burned. Twenty-five deer or deer-sized fragments, and one antelope fragment were identified. Two fragmented bone tools were found. One had polish on the tip; the other had some incising and general polishing on the surface. This concentration occurs approxiately one meter southeast of the artifact cache.

The remains of a surface hearth were uncovered in 52N28E (Levels 110-120, Feature 8). Fire-modified rock, intense carbon staining, and remnants of burned log occurred in a 100 by 100-cm area (Figure 6-6). A concentration of 160 salmon vertebrae was collected at the end of the log. Other identified bones include three deer-sized fragments and a painted turtle plastron. A utilized flake and a unifacially retouched flake were the only tools recovered. This hearth area, dated to 1022±65 B.P., is apparently associated with the two concentration of bone and debris to the north and west.

The bone concentration to the north (Feature 13, 53N28E, Level 120) is another concentration of fire-modified rock, burned and unburned bone, and lithic debris strewn over a kidney-shaped area (160 x 70 cm) (Figure 6-6). Identified bone includes an antelope scapula, a deer mandible, and an antler fragment. Small amounts of charcoal lay within the feature. The only tools recovered were a maul and a core.

The second concentration to the west of the surface hearth, is another thin layer of bone, rock, and charcoal concentrated in 52N27E (Levels 110-120, Feature 14). This extremely dense concentration contains 936 unidentified

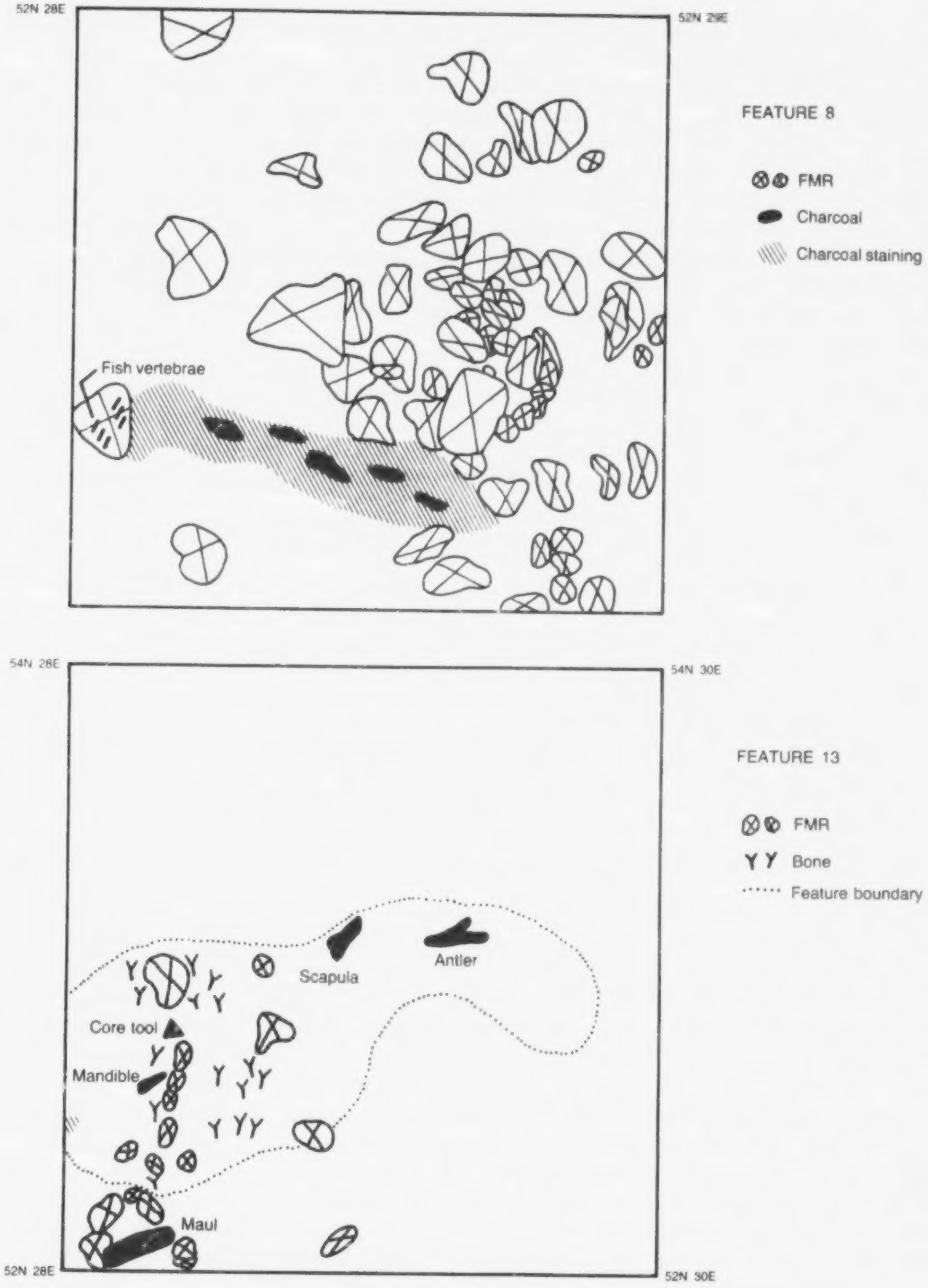

52N 28E
52N 29E
Fish vertebrae
FEATURE 8
⊗ FMR
● Charcoal
▨ Charcoal staining
54N 28E
54N 30E
Scapula
Antler
Core tool
Mandible
Maul
52N 28E
52N 30E
FEATURE 13
⊗ FMR
Y Bone
······ Feature boundary

Figure 6-6. Plan maps of remnant hearth (Feature 8) and associated activity area (Feature 13), 45-DO-214.

bone fragments, 11 antelope, 11 deer, three salmon, two mountain sheep, and 36 deer-sized bone fragments in a 75 by 40-cm area (Figure 6-7). Excavators recovered several stone artifacts from this area--two unifacially retouched flakes, two utilized flakes, one bifacially retouched flake, one scraper, and one projectile point. Two pieces of smoothed (or polished) and incised bone are recorded, but none of the identified bone shows any signs of burning or butchering. Charcoal, burned organic material, and discolored soil, however, do indicate some burning. This discrepancy suggests that the bone was dumped or processed on this spot after the fire. The thinness of the deposit (11 cm) suggests that the area was only used during a single season or event, such as the preparation of food around a fire hearth (i.e., the surface hearth described above).

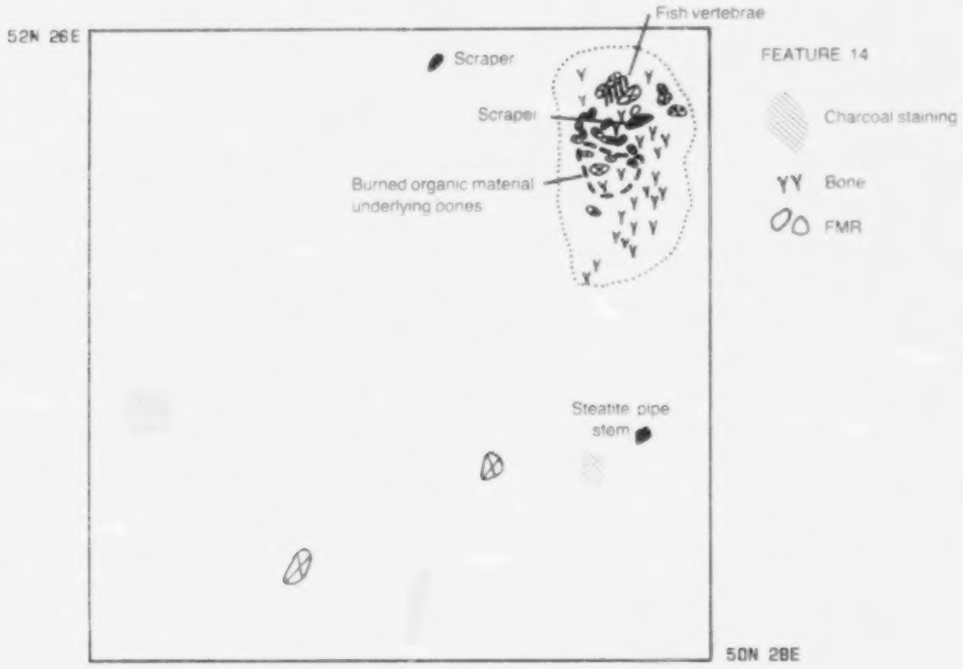


Figure 6-7. Plan map of bone and rock concentrations in Zone 3 (Feature 14), 45-DO-214.

A portion of a firepit was exposed in the southwest corner of 65N26E (Levels 140, 150; Feature 3). The alignment of eight granite and basalt rocks associated with charcoal and stained soil indicates a very shallow, circular firepit. Although "some pieces of shell" were noted by excavators, no material was collected from this feature. This firepit occurs in the same unit and stratum as the concentration of rock in 66N26E (Level 140, Feature 2). This "concentration" consists of seven angular basalt rocks laid out so they touch one another. Although they show no signs of burning or modification, they are assumed to be cultural in origin since they occur in

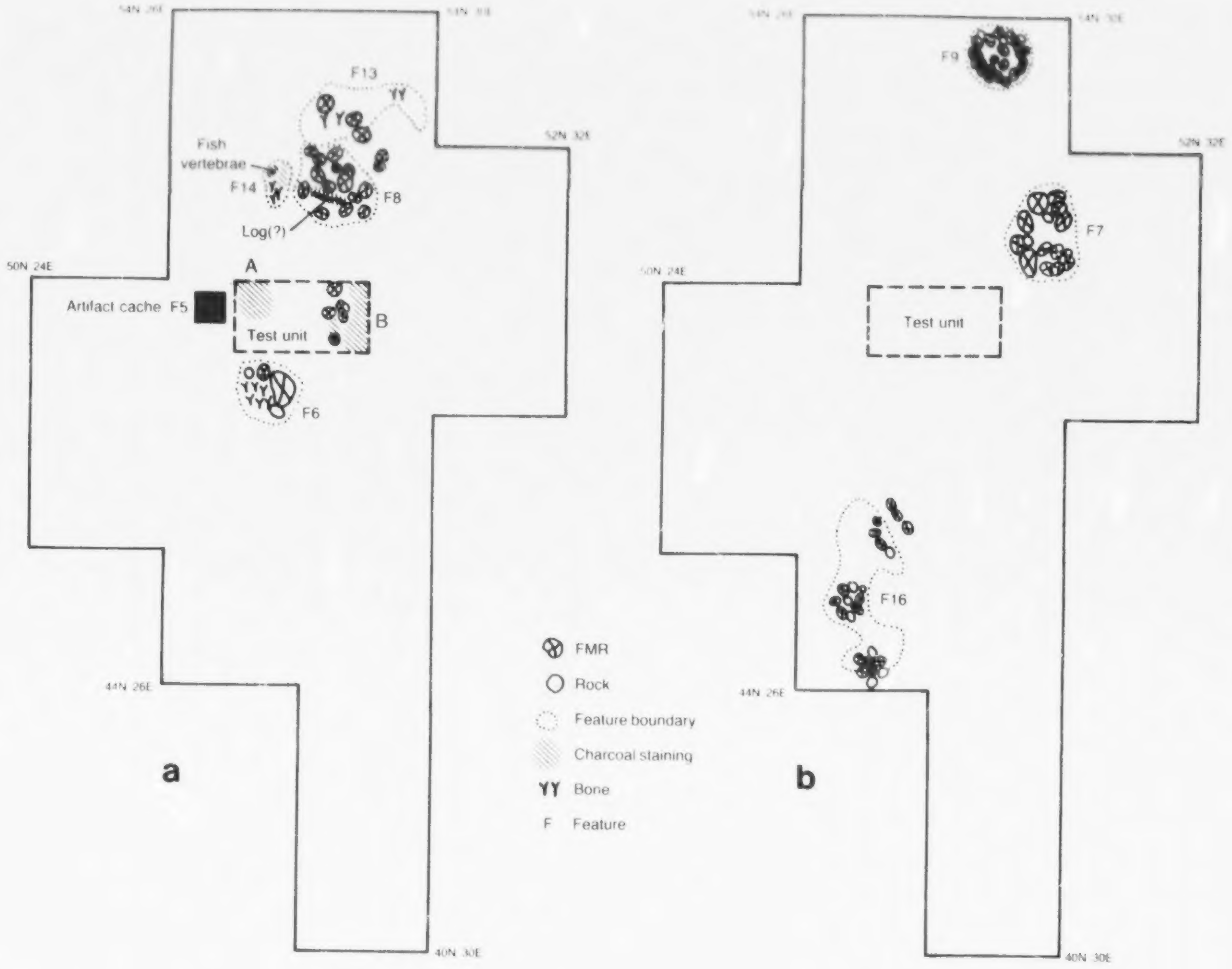

54N 26E
54N 30E
52N 32E
50N 24E
44N 26E
40N 30E
F13
Fish vertebrae
F14
F8
Log(?)
A
B
Artifact cache F5
Test unit
F6
a
54N 26E
54N 30E
F9
52N 32E
F7
50N 24E
Test unit
F16
44N 26E
40N 30E
b
FMR
Rock
Feature boundary
Charcoal staining
Bone
F Feature

Figure 6-8. Plan map ot Features from Zone 3 (**a**) and Zone 2 (**b**) exposed in block excavation, 45-DO-214.

concentration in a sand matrix. Concentrations of basalt do not occur naturally in such a formation (see Chapter 2). This concentration may represent a store of basalt rocks for later use in ovens, hearths, or the like. Its proximity to the firepit supports this hypothesis.

The spatial distribution of Zone 3 features suggests that most activity took place closer to the present day beach than did activities of Zone 4. The proximity of the features within the block excavation in Zone 3 (and Zone 2) and stratigraphic information suggests they represent discrete activities on a single occupation surface (Figure 6-8). The abundance and variety of features--fire hearths, pits, caches, and well-defined use surfaces--testifies to an occupation of the site of greater intensity and longer duration than the Zone 4 occupation; of course, it may be that Zone 3 features are simply better preserved than the features of Zone 4. In any event, the ten features of Zone 3, combined with the several artifact scatters and lenses of debris (which were not designated as features), create a picture of an intensively used camp with activity areas and occupation surfaces. These, in turn, were rapidly covered and preserved.

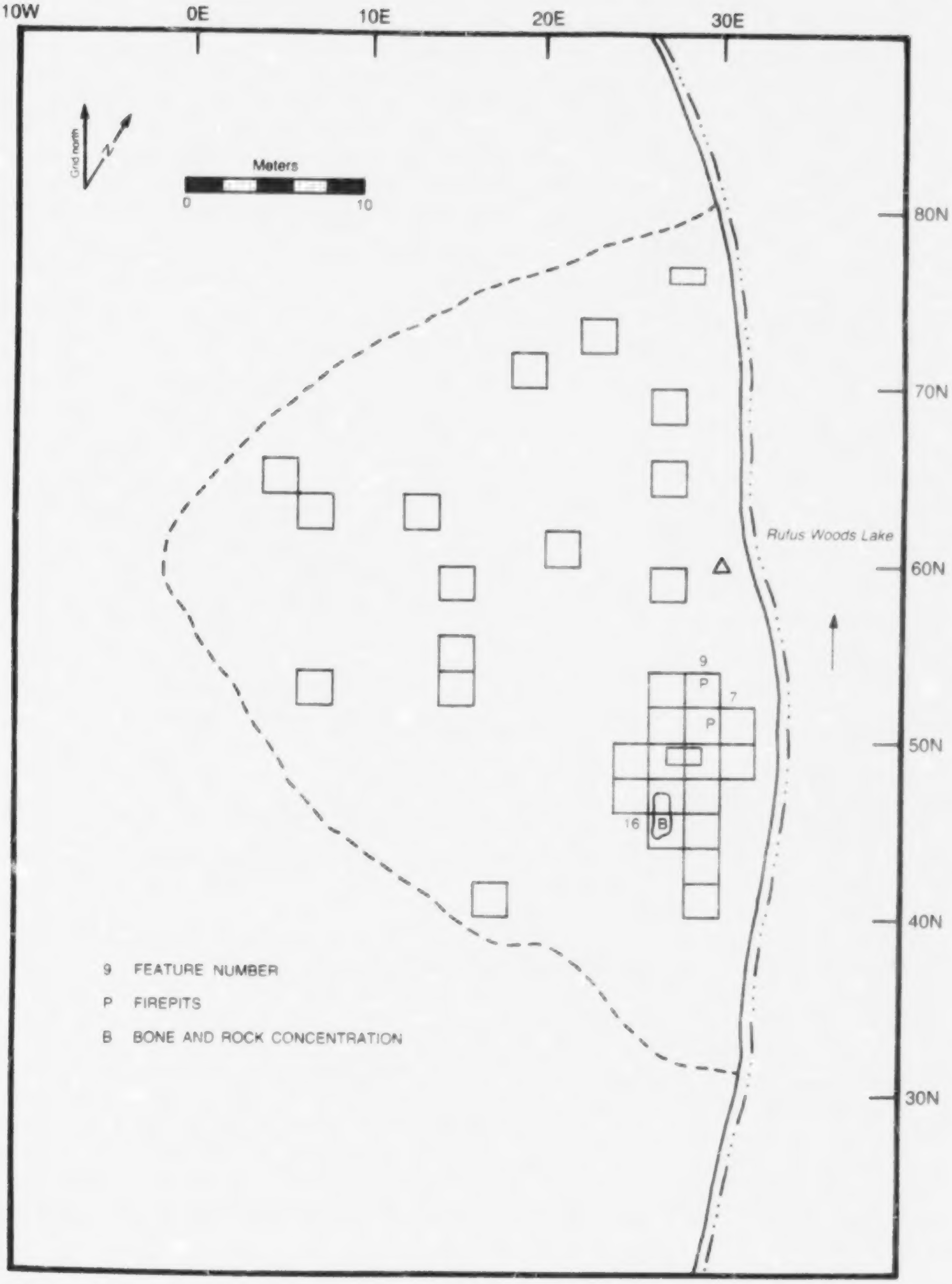
ZONE 2

The three features of Zone 2--a cooking pit, earth oven, and a possible activity area--are similar in structure and content to the features of Zone 3 (Figure 6-9). Indeed, the dating of Zone 2, 1200-1000 B.P., is the same as that of Zone 3.

A large firepit (100 x 75 cm) occurs in 52N28E (Levels 90-100, Feature 7). Characterized by fire-modified rocks and heavily carbon-stained soil, it also contained bone and some shell fragments (Figure 6-10). The firepit lies two meters south of the second pit in Zone 2, a large earth oven in 54N28-29E (Feature 9).

The earth oven (Feature 9) is a more complex feature than the other firepits at 45-DO-214, as the number of fire-modified rocks (Table 6-1) and illustrations (Figure 6-10) indicate. Large rocks line the sides and bottom of the pit, while its interior is filled with smaller rocks and larger pieces of charcoal. The distribution of charcoal suggests that the site occupants placed wood fuel beneath the smaller, flatter rocks at the time of firing. These stones collapsed into the depression as the fuel burned. Radiocarbon dated to 1170±71 B.P., this feature is similar to ethnographically documented earth ovens (Ray 1932:106; Post, in Spier 1938:27).

An irregularly shaped concentration of orange soil, darkened soil, ash and charcoal also occurs in the block excavation (Figure 6-11, Feature 16) several meters south of the pit features. In association with this area are numerous fire-modified rocks, bone and lithic debris, and lithic tools. This feature occurs within six 1-m^2 units (45N26-27E, 46N26-27E, and 47N26-27E), but does not cover 50% of any one of them. Its actual dimensions are approximately 175 x 110 cm. The artifact counts recorded here and in Table 6-1, as with all laboratory defined features, are taken from mixed feature and unit levels, and may be misleading; it is impossible to determine which artifacts are directly associated with the discolored matrix. Excavators


10W
0E
10E
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30E
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N
Meters
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10
80N
70N
60N
50N
40N
30N
Rufus Woods Lake
9
P
7
P
16
B
9 FEATURE NUMBER
P FIREPITS
B BONE AND ROCK CONCENTRATION

Figure 6-9. Location of features, Zone 2, 45-DO-214.

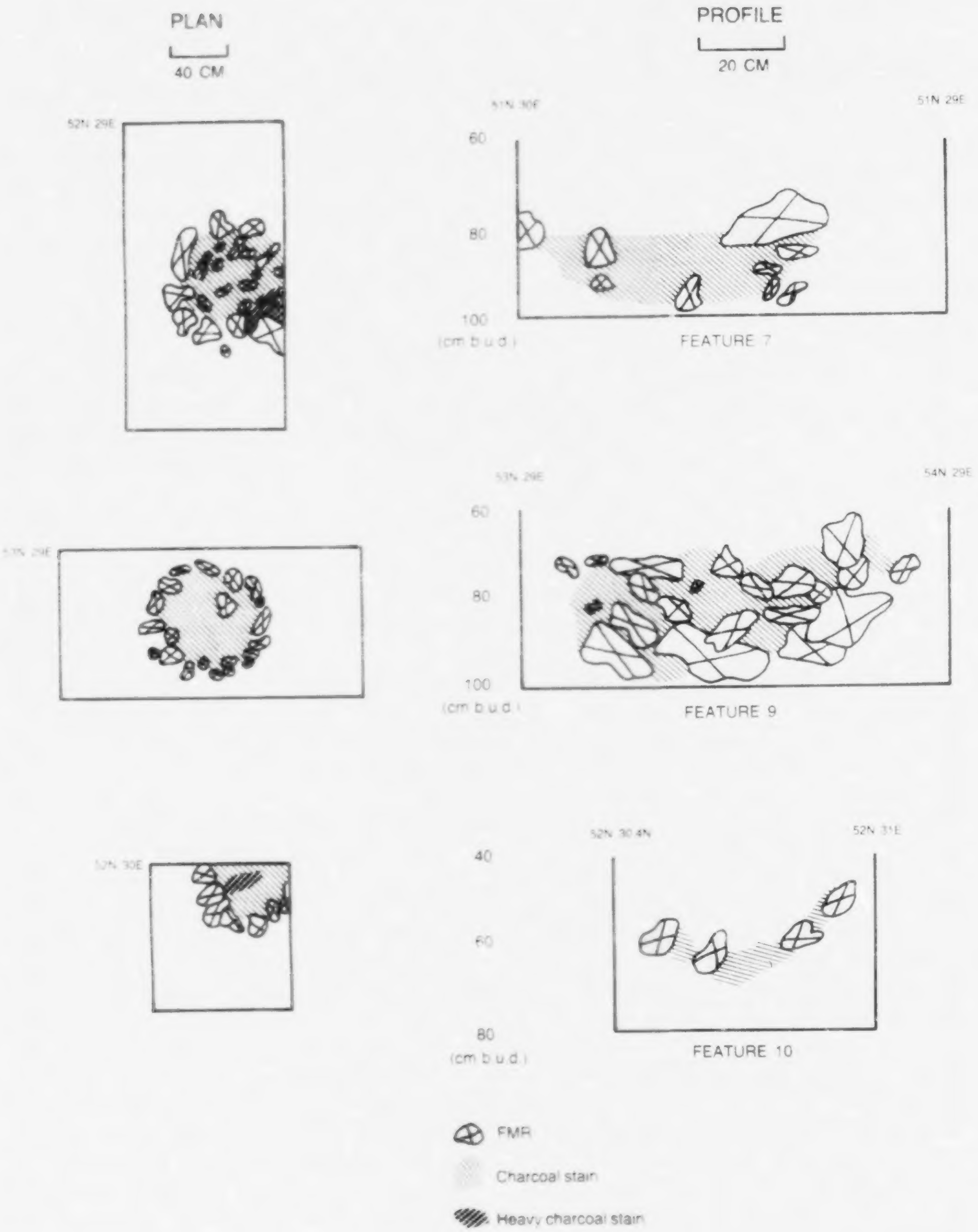

PLAN
40 CM
PROFILE
20 CM
52N 29E
51N 30E
51N 29E
60
80
100
(cm b.u.d.)
FEATURE 7
53N 29E
53N 29E
54N 29E
60
80
100
(cm b.u.d.)
FEATURE 9
52N 30E
52N 30.4N
52N 31E
40
60
80
(cm b.u.d.)
FEATURE 10
FMR
Charcoal stain
Heavy charcoal stain

Figure 6-10. Firepits in Zone 2 (Features 7 and 9) and Zone 1 (Feature 10), 45-DO-214.

recovered numerous tools from the six 1-m squares: 29 utilized flakes, four tabular knives, four unifacially retouched flakes, three bifacially retouched flakes, four resharpening flakes, ten bifaces, two scrapers, three wedges, two projectile point tips, a graver, and three indeterminate tools. Identified bone fragments include six salmon, one elk-sized, one mule or white-tailed deer, five frog, and 13 rodent bone fragments. The unidentified bone count listed in Table 6-1 may be deceptively high; this feature's contents were analysed before the implementation of a laboratory policy that screened out bone <1/8 in in length. The bounded area of modified soil suggests that this feature is a discrete area of activity where, perhaps, fish and game were processed.

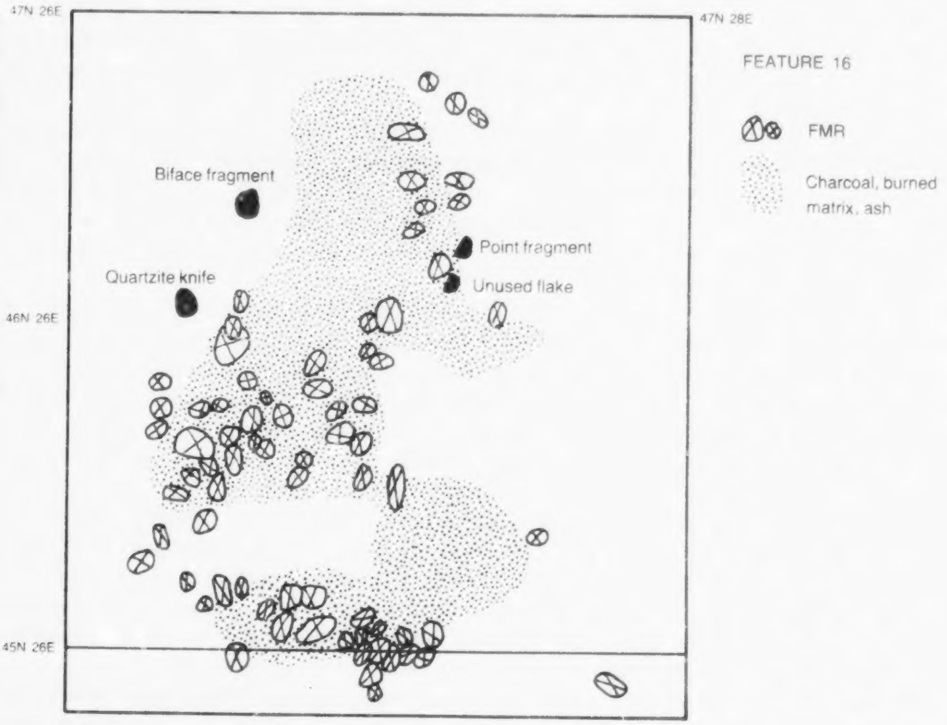


Figure 6-11. Plan maps of bone and rock concentration in Zone 2 (Feature 16), 45-DO-214.

The radiocarbon date of 1170±71 B.P. obtained from the earth oven indicates close contemporaneity with Zone 3. It is not surprising, therefore, that the features in these two zones should be so similar. Table 6-1 shows that shell counts decrease from Zone 4 to Zones 3 and 2, while bone counts increase dramatically. The features of Zones 3 and 2 also yielded the only salmon bone at the site. The focus of economic activity seems to have shifted from shellfish in Zone 4 to salmon and large mammals in Zones 3 and 2.

ZONE 1

Zone 1 contains five features (Figure 6-12): two surface hearths, a firepit, and two concentrations of debris. The zone dates from 1000 B.P. to the protohistoric period.

A surface hearth in 70N27E (Feature 1, Level 50) is similar to the other hearths at the site, but neither its boundaries nor its function can be determined as easily. Consisting of 12 basalt fire-modified rocks in a semicircular alignment, Feature 1 contains no traces of charcoal, soil staining, or other cultural material. Other fire-modified rocks were scattered nearby within the 2-m^2 unit. Their relationship to the probable hearth is unclear, but it is possible that they were removed from it by human or natural agency.

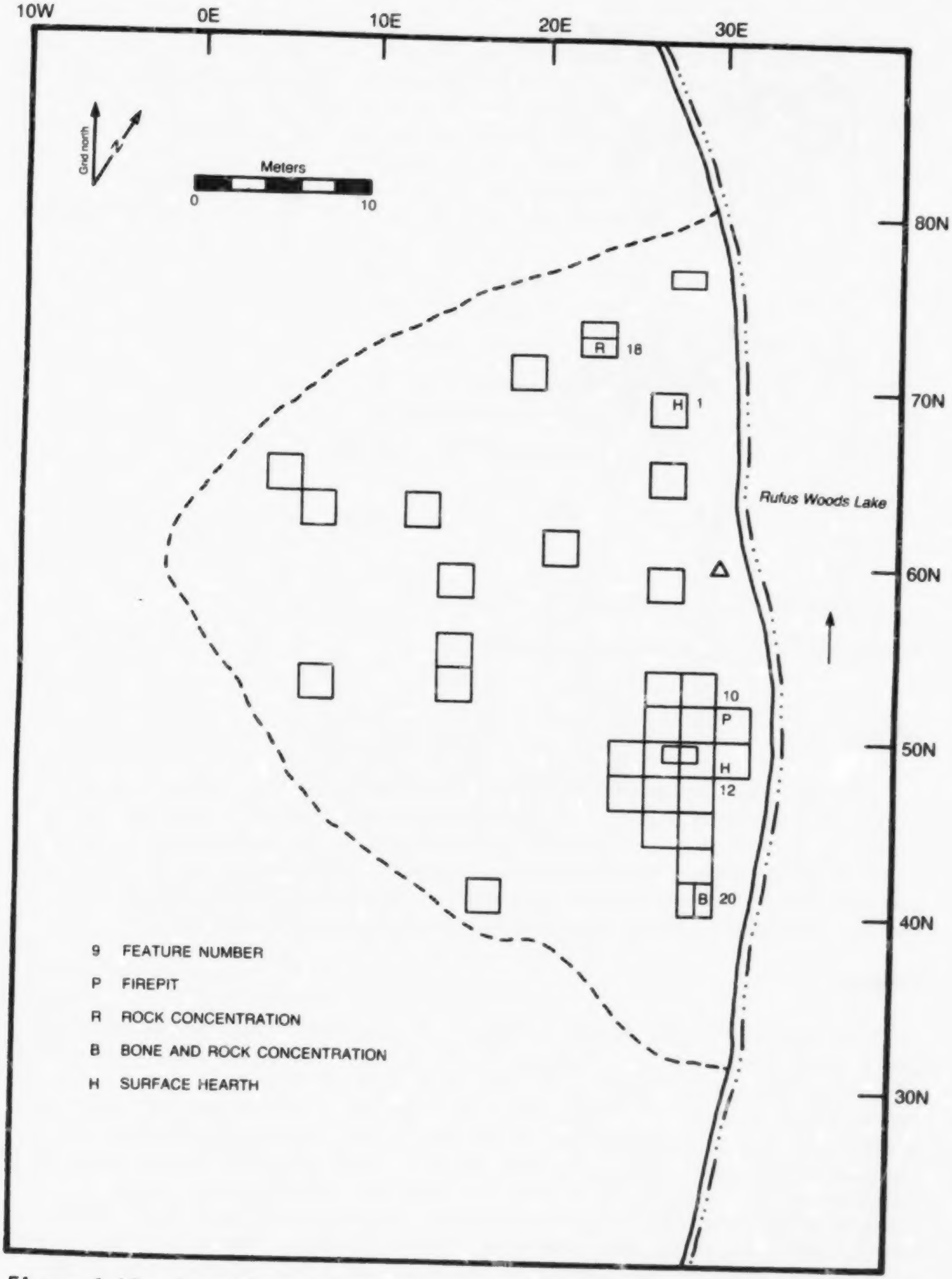
A second surface hearth (Feature 12, 49N30E, Levels 50-60) consists of 19 fire-modified rocks in a semicircular arrangement, charcoal, and carbon-stained sand. This hearth is 55 cm across in the southern wall of the unit, but only the upper third of an apparently circular feature was exposed. Limited cultural material make up this feature (Table 6-1); none of the 169 bone fragments are identifiable.

The firepit (Feature 10, 52N30E, Levels 60-70) which occurs in this zone falls in the same structural class as those of Zone 2, but, as can be seen in Figure 6-10, it is not nearly as elaborate. Only five fire-modified rocks and eight bone fragments were recovered from a 60 x 40 x 20-cm area. The feature apparently did not serve as a cooking pit; it is not filled with charcoal, rocks, and debris, as were the pits of Zone 2. Instead, this was merely a fire built in a shallow depression dug for that purpose.

A rock concentration in Zone 1 (Feature 8, 73N22-23E, Levels 60-70) resembles the one recorded in Zone 3 (Feature 2). It is a scatter of granite and basalt rocks, only a few of them fire-modified. Seven flakes and a single deer-sized bone fragment were recovered. The feature's function is unknown.

A probable activity area recorded in unit 42N28E (Levels 40-60, Feature 20) strongly resembles the one recorded in Zone 4 (Figure 6-13). Two unpatterned concentrations of fire-modified rock, burned bone, and charcoal occur in the west half of the unit. Cultural debris extends over the entire unit in Levels 50 and 60. One scraper, two utilized flakes, two resharpening flakes, one projectile point tip, one tabular knife, an anvil stone and 51 waste flakes were recovered from this feature. Identified bone includes a frog skeleton, two deer bone fragments, and three pieces of rodent bone. The feature may represent one or possibly two eroded fire hearths with surrounding use surfaces.

The features of Zone 1 resemble those of Zone 4 more than those of Zones 2 or 3. Only one firepit and one eroded use surface were defined. At least two surface hearths were constructed, but one (Feature 1), apparently, did not see much use. Given the scarcity of both shell and salmon in the zone's features, it may be the local economy had again shifted.


10W
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Rufus Woods Lake
R
18
H
1
10
P
H
12
B
20
9 FEATURE NUMBER
P FIREPIT
R ROCK CONCENTRATION
B BONE AND ROCK CONCENTRATION
H SURFACE HEARTH

Figure 6-12. Locations of Features, Zone 1, 45-DO-214.

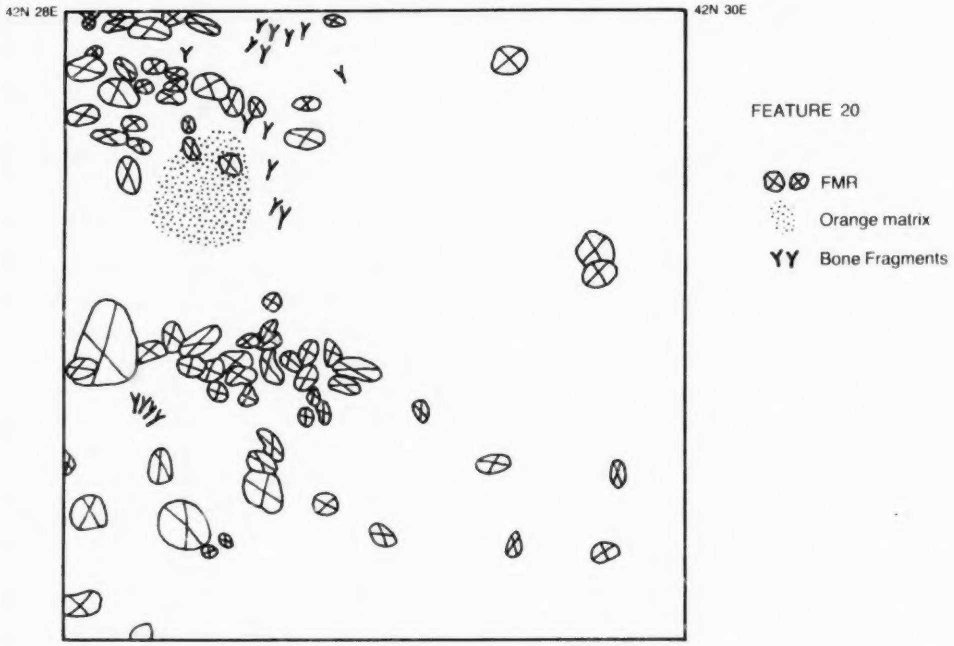


Figure 6-13. Plan map of bone scatter in Zone 1 (Feature 20), 45-DO-214.

FEATURE 11

A petroglyph, measuring 8 x 10 cm, was found on the vertical face of a basalt boulder uncovered in the northeast corner of 60N27E. The boulder itself extends from Level 100 to Level 160 and, while the petroglyph occurs near the upper edge, exact provenience cannot be determined and so the feature was not zoned. No contemporary occupation stratum could be defined. The petroglyph has the form of a human (?) face or a mask (Plate 6-2).

SUMMARY

An analysis of the cultural features found in all four of the analytic zones of 45-DO-214 reveals functional differences among the zones. Figure 6-14, which shows the frequency of the functional feature types in the four zones, makes these differences strikingly evident. It suggests a tripartite division of the site, functionally and temporally. During the time represented by Zone 4 shellfish was the principal exploited resource--all the features of that zone contain shell; indeed, all the rock and shell concentrations are confined to this zone. In sharp contrast, the features of Zones 3 and 2 held the only identified salmon bones at the site. These zones also contain most of the occupation surfaces and pits. Radiocarbon dates indicate little time difference between Zones 3 and 2, and feature analysis reveals important similarities; it may be that Zones 3 and 2 are sub-units of a larger cultural division. During the deposition of these zones, the occupants evidently used the site as a hunting camp, though they probably also manufactured fishing gear there and processed their catches. On the other hand, the features of Zone 1 yielded no fish bone and little shell. The bone and lithics, found in association with the surface hearths and the firepit, suggest that the site served as a hunting camp at this time.

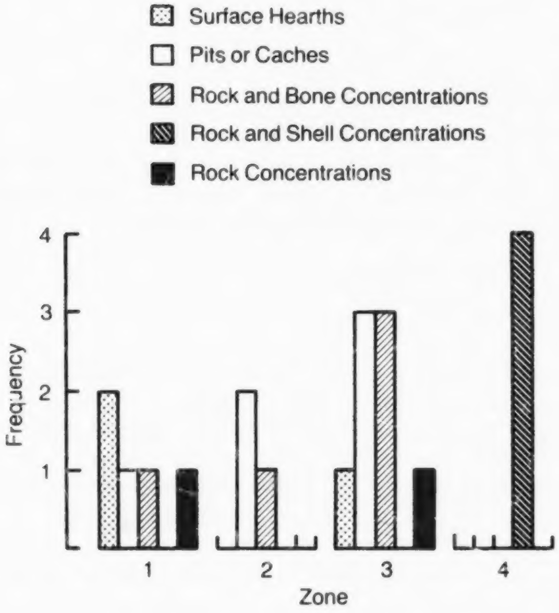


Figure 6-14. Frequency of feature types by zone, 45-DO-214.

7. SYNTHESIS

This chapter summarizes and integrates the information presented in the previous chapters. The following sections describe geological, chronological, faunal, botanical and seasonality data and the horizontal distribution of artifacts and features associated with each zone. The final section discusses the site and its relation to the project area and Plateau archaeological record.

GEOCHRONOLOGY

The surface of the terrace on which 45-DO-214 is located was covered by small active and semi-active dunes. However, the underlying sediments reveal a horizontal discontinuity between the western and eastern portions of the site. To the west, they are predominantly colluvial as a consequence of the steep terrace front forming the western site boundary. To the east, matrix accumulation resulted from activities of the Columbia River.

Zone 4 is associated primarily with the western portion of the site and with deposits representing a former river bank, associated erosional surface and beach deposits (DUs I and II). Some of the cultural material from the eastern portion of the site represents secondary deposits lagged onto the cobbles and included in beach sands as the river eroded the bank. Projectile point styles indicate occupation between 4000 and 2000 B.P. An erosional episode, occurring when the river cut away the terrace, may account for the hiatus of about 800 years suggested by the projectile point sequence and radiocarbon dates from the successive zones.

Zones 2 and 3 are associated with eastern overbank deposits modified by aeolian and colluvial deposition (DUs IIIa and IIIb). Both variation in texture and the presence of cultural surfaces and features within the two zones allow us to separate them. Rapid deposition resulted in well preserved cultural material. Radiocarbon dates, projectile point styles and depositional history indicate a series of occupations between 1200 and 1000 B.P.

Zone 1 is composed of more overbank deposits (DU IIIc), a buried modern surface (DU IVa) and recent flood deposits (DUs IVb and IVc). This zone is not restricted to the eastern portion of the site as were Zones 2 and 3. Projectile point styles indicate use from 1000 B.P. to the protohistoric. Modern material is primarily confined to the upper two depositional units.

CULTURAL CHRONOLOGY

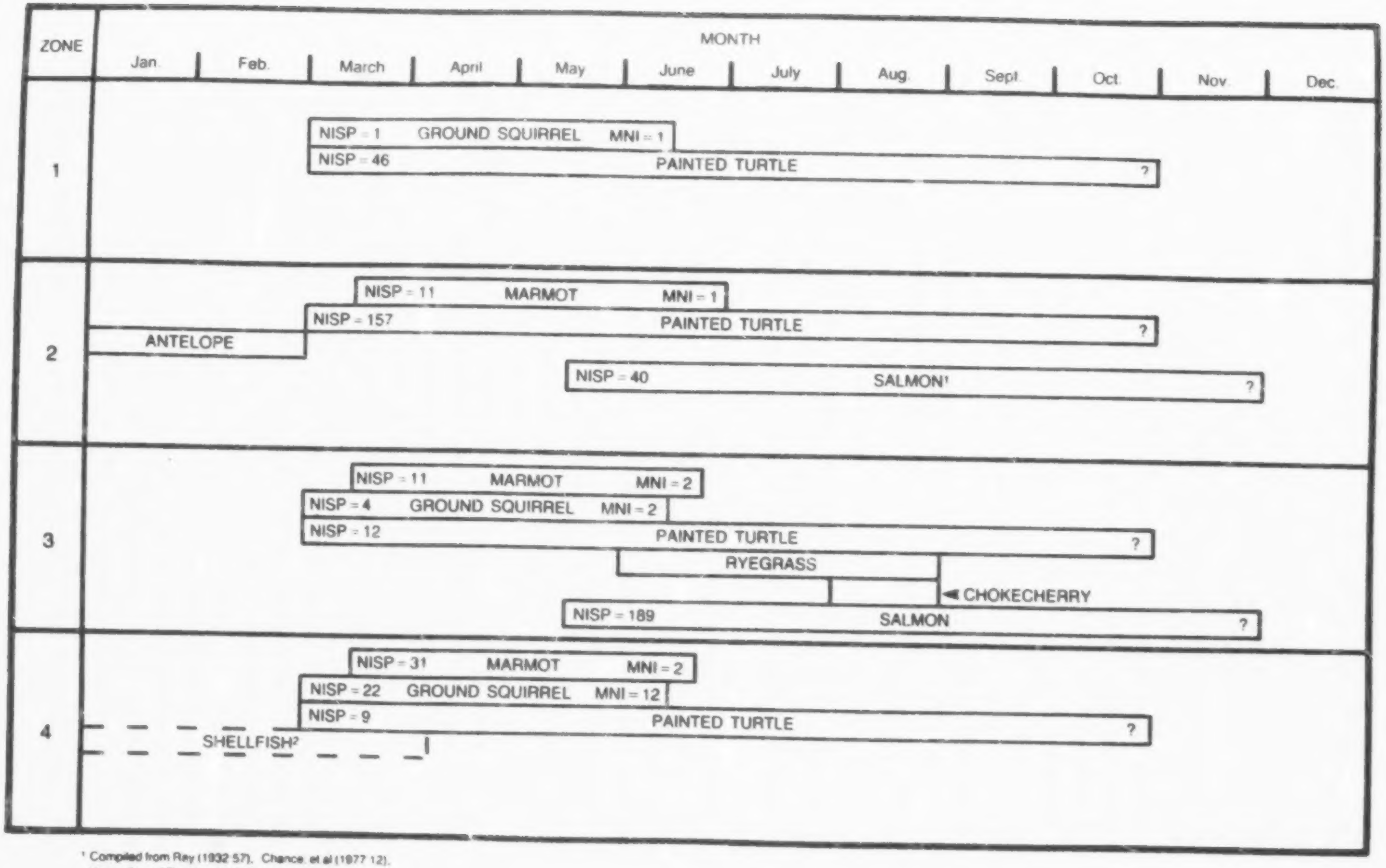
Radiocarbon age determinations are available only for Zones 2 and 3 at 45-DO-214. The clustering of the dates between 1200 and 1100 B.P. and the association with the appearance of distinctive projectile point styles contributes to the project-wide chronology. The dates and styles associate Zones 2 and 3 with the project's Coyote Creek Phase. This period corresponds with the Cayuse Phase on the Middle Columbia, the late Chiliwist Phase on Wells Reservoir and the Takumakst Period at Kettle Falls (Figure 3-19).

The other zones can be dated by means of stylistic projectile point variation. Distinctive styles from Zone 4 (Types 5, 6, 8 and 12) appear as early as 4500 B.P. and continue until 1000 B.P., thus falling within the Hudnut Phase in the Rufus Woods Lake cultural sequence. The absence of projectile point styles or other evidence from the zone assemblage of either older or younger age suggests the zone age might be restricted even further. We note the absence of Quilomene Bar basal and corner-notched forms and Cold Springs side-notched forms. This absence when compared to the historical stylistic sequence on the Middle Columbia where the Cold Springs and Quilomene Bar Phases are defined primarily on the basis of these stylistic markers might lead us to restrict the age to 3800 to 2800 B.P., the Frenchman Springs Phase (Nelson 1969). However, the definition of these phases primarily on the basis of these projectile points has recently been questioned (Galm et al. 1981). Such projectile point styles are rare in the project area and their temporal significance poorly documented. We suggest that the Sunset Creek sequence (Nelson 1969) cannot be invoked uncritically. Thus, we choose to retain the broad Hudnut Phase age estimate for Zone 4 rather than rely on stylistic comparisons alone. The time span corresponds to the Frenchman Springs and Quilomene Bar Phases on the Middle Columbia, the lower Chiliwist at the Wells Reservoir and a hiatus in occupation at Kettle Falls (Figure 3-19).

Distinctive projectile point styles from Zone 1 and its stratigraphic position, indicate occupation dates ranging from 1000 B.P. to protohistoric time. This places the occupation in the later Coyote Creek Phase. The time span corresponds to the late Cayuse Phases on the Middle Columbia, the Cassimer Bar Phase at Wells Reservoir and the Sinlakst and Shwayip Periods at Kettle Falls (Figure 3-19).

SEASONALITY

Floral and faunal indicators of seasonality were recovered from all the analytic zones at 45-DO-214 (Figure 7-1). Few of the indicators are independently reliable. Because of their nature and definite cultural associations, the strongest indicators are the immature antelope jaw (Zone 2), and the ryegrass remains and chokecherry pit from Feature A associated with the cache of Feature 5 (Zone 3). Other indicators are less reliable. The painted turtle bone may represent a cup or bowl transported to the site rather than the by-products of subsistence activities. The ground squirrel and marmot bone may not represent cultural deposition. Ground squirrels, however, do not seem to be common inhabitants of the project area--their remains occur



[1] Compiled from Ray (1932:57), Chance et al (1977:12), Kennedy and Bouchard (1975:4-5, 12), Schalk (1978:70)
[2] Ray (1932:58)

Figure 7-1. Distribution of seasonal indicators by zone, 45-DO-214.

infrequently at other sites. Similarly, suitable habitat for a marmot does not occur in close proximity to the site.

The faunal remains are more or less reliable indicators depending on the degree to which we can infer primary deposition. If we rely on frequency alone, the higher numbers of turtle bone in Zones 1 and 2 are more indicative of primary deposition than the lower numbers in Zones 3 and 4. Similarly, ground squirrel is a more reliable indicator in Zone 4, and marmot more reliable in Zones 3 and 4. Shellfish use in winter and early spring relies on ethnographic analogy (Ray 1932:58); although analysis of shell growth rings would provide additional seasonal data. Finally, the site may well have been used and no seasonal information left. Thus, while the indicators are imperfect witnesses to the season of site use, they provide us with the only available estimates and suggest variation within and among the zones.

If the assumption is correct that shellfish were used in early spring, we may infer that the site was used at least from mid-February through mid-April in Zone 4. If shellfish are eliminated, the marmot remains become the limiting factor and the time of use may be shifted and expanded slightly to extend from March through June.

Zone 3 appears to have two sets of overlapping indicators. The co-occurrence of the ryegrass and chokecherry with ground squirrel, turtle and salmon suggests a summer occupation in August and early September. A second occupation can be proposed from March through June to account for the marmot remains.

In Zone 2, the juvenile antelope jaw is the sole indicator for a winter use of the site. The other factors coincide only in May and early June. If the marmot is used as the limiting factor, it suggests an additional mid-March through June occupation. These multiple time spans in Zones 2 and 3 do not seem at all implausible given the character of the cultural concentrations.

The only indicators of seasonality yielded by Zone 1 were ground squirrel and painted turtle remains. No factor restricts the season of use to less than a March through October span.

The data from all zones indicate the site was used most consistently during the spring. The most precise seasonal indicators--those of Zones 2 and 3--represent additional late winter and summer occupations.

FAUNAL REMAINS

The taxa identified in the faunal analysis include species indicated in ethnographic studies as important sources of meat and hides. Ground squirrels, muskrat, beaver, marmots, rabbits and hares, badger, dog/coyote, antelope, mountain sheep, possibly bison, elk, white-tailed deer, fish and painted turtle all served economic needs. While bone is associated with features in all zones, it is most characteristic of Zones 2 and 3 where the processing of game appears to have been a major activity. Bone is also prominent in Zone 1 where it makes up over 60% of the assemblage (Table 2-2). Several species, including beaver, hare, rabbit, badger, dog/coyote, were identified only in Zones 2 and 3 (Table 7-1). Most of the artiodactyl remains are from those zones as well. Similarly, fish remains are found in all zones, but predominate in Zones 2 and 3.

Table 7-1. Distribution of economic fauna among analytic zones, 45-DO-214. Figures indicate percentage of the zone asemblage represented by each taxa.

Economic Fauna	Zone			
	1	2	3	4
Ground squirrel	0.8	0.7	2.2	26.5
Marmot	–	2.4	2.7	15.5
Beaver	–	–	1.2	–
Hare	1.6	–	0.5	–
Rabbit	–	–	0.2	–
Badger	–	–	0.2	–
Dog/Coyote	–	0.4	–	–
Antelope	0.8	0.4	5.4	–
Mountain sheep	2.5	3.0	4.1	1.0
Cow/Bison	0.6	0.4	–	0.5
Elk	–	0.7	0.2	0.5
Deer	6.7	15.8	21.7	6.0
Elk-Sized	0.8	1.1	1.9	0.5
Deer-Sized	13.4	13.0	47.9	2.5
Salmonid	5.8	0.7	46.0	2.5
Carp/Minnow	2.5	5.6	2.2	–
Painted turtle	38.6	34.1	2.9	4.5

In contrast, bone makes up less than 35% of the total assemblage from Zone 4 (Table 2-2). Instead, shell predominates, composing over 50% of the assemblage. In this zone, shellfish processing is the major activity, augmented by processing of game. Above Zone 4, shell continues to appear in all of the zones, but in much reduced numbers.

Of great importance to our interpretation of site use are the bone tools from Feature 5 (Zone 3), the cache. We believe they represent a process aimed at the manufacture of both utilitarian and decorative items. The bone artifacts associated with fishing technology, along with the salmonid remains in Zone 3, obviously suggest fishing activity. Analysis has shown evidence of fishing at two other sites in close proximity to 45-DO-214, 45-DO-285 and 45-DO-211. We cannot, however, determine the relative importance of fishing; nor do the small numbers of fish bone provide us with any strong clue. The low frequencies may be due to recovery methods, poor preservation, or may represent processing practices occurring elsewhere.

A comparison of the seasonality data and the faunal distribution with the ethnographic pattern for the Sanpoil and Nespelem recorded by Ray (1932) yields partial correspondence. Small game were hunted in the spring and summer before and between the major salmon runs (Ray 1932:77). We have noted that both ground squirrel and marmot are common in the Zone 4 deposits, and are found in Zone 3 with hare, rabbit and badger. Both zones have been attributed spring occupations and a late summer occupation has also been proposed for Zone 3. Here we have a correspondence between faunal evidence at the site and recorded ethnographic patterns.

The ethnographic pattern corresponds less well to the large mammal remains in part because of low numbers of individuals identified. Deer and elk were hunted in the winter from November through March (Ray 1932:77). Deer are found in all four zones as are elk or elk-sized remains. They are most common in Zones 2 and 3. If we use the maximum possible estimates, the Zone 3 season of use includes November and March, the extremes of the ethnographic hunting season. However, this excludes the summer occupation of August. The juvenile antelope jaw in Zone 2 means we do not have to make use of maximum estimates to define winter season of use. However, this brings us up against a new discrepancy with ethnographic records: antelope were hunted in the summer and fall (Ray 1932:82). While this reported timing corresponds well with the inferred seasonal use of Zone 3 where the greatest numbers of antelope remains were recovered, it does not correspond with the late winter use of Zone 2. The antelope may, of course, represent the fortuitous procurement of a young animal.

Summing up, the continued spring use of the site through time for hunting and game processing corresponds somewhat with the ethnographic pattern. We also have evidence from seasonality, faunal and botanical data from 45-DO-214 suggesting that the hunting seasons in the past were not as restricted in the past as Ray described and that fishing, shellfish and other resource gathering were concurrent activities.

BOTANICAL REMAINS

The botanical analysis has demonstrated the use of fruits, fibers and wood. The distribution of species among zones is shown in Table 7-2. Many are locally available and were used for fuel: most of the samples are burned. The Indian hemp and birch bark are known to have been used ethnographically for cordage and hafting. The birch and hemp examples here are pitch soaked and associated with tools made from woods of mock orange, yellow pine, Douglas fir, and red cedar. We believe these tools and the possible cordage material associated with Feature 5 in Zone 3, along with a number of bone and stone artifacts, compose a tool kit for the manufacture of bone tools (Table 3-24).

Woods of other species recovered, including vine maple, yellow cedar, spruce, serviceberry, hawthorn, oceanspray and yew, are also among those reported, in the ethnographic literature, to have been used for wooden tools. Ryegrass has been noted as important in pit cookery. Only the chokecherry, a

Table 7-2. Flora Identified at 45-DO-214.

Identifiable Elements	Zone			
	1	2	3	4
Vine maple			x	
Indian hemp			x	
Western birch			x	
Alaska yellow cedar			x	
Red cedar	x		x	
Cupressaceae	x	x	x	x
Mock orange			x	
Yellow pine	x		x	x
Douglas fir	x		x	x
Spruce			x	
Other conifer		x	x	x
Ryegrass		x	x	
Knotweed			x	
Serviceberry				x
Hawthorn			x	x
Serv/Haw/Rosaceae	x	x	x	x
Oceanspray		x	x	
Chokecherry			x	
Bitterbrush	x	x	x	
Other hardwood		x	x	
Yew		x	x	x
Unidentified seeds	x	x	x	
Leaf and stem tissue	x	x	x	x

small bit of lomatium tissue from Zone 2, fragments of hawthorn and pine seed coats from Zone 3 and several unidentified seed coats and bits of tissue indicate that plant foods were consumed here.

The site occupants apparently exploited more than the local flora. Western birch, oceanspray, spruce, Alaska cedar, red cedar, and yew--all found at the site--do not grow in its proximity. Western birch, oceanspray and spruce now grow in the uplands of the Okanogan County side of the river. The cedars may have floated down the river, or they may have been acquired elsewhere through travel or trade. The yew, especially, is very likely a wood imported from the north or west. These species along with the dentalium bead from Zone 3 and the exotic lithic materials--obsidian in Zones 1, 2 and 4 and possibly nephrite in Zones 2, 3 and 4--suggest trade or travel.

Even though Zone 3 has by far the greatest concentration of floral remains in terms of sample size and number of species represented, we should not underestimate the use of plants for food and tools. Poor preservation coupled with the selective character of sampling and recovery methods undoubtedly hinder our ability to see when and how they were used.

ARTIFACT DISTRIBUTION

This section discusses the horizontal spatial patterning of the zone assemblages. We rely on the spatial distribution of features and artifact class frequencies by unit to define areas of economic interest and more widespread distribution to define the extent of site use. Although organization of prehistoric activities is likely to be complex at even the most temporary locations occupied by small groups, the kinds of cultural material recovered allow us to infer the subsistence related activites that went on at the site. Peak frequencies of cultural material, indicating refuse accumulations, lithic manufacture, food processing, or hearth areas should occupy a nuclear area within a wider scatter of debris. The patterning of such artifact distributions enable us to discuss the organization of activities within each zone.

Several factors influence the zone distributions and the inferences that can be made from them: the location and number of the sampling units in relation to the size and spatial pattern of the occupations, the rate of artifact discard, duration of the occupancy, the number of reoccupations within a zone, the degree to which two or more such occupations overlap, and disturbance of the artifact patterns after deposition. The last factor is of greatest importance. Two principal postoccupation disturbances occur at almost every site in the project area: stream and river erosion; and vertical displacement by rodents. The upward and downward dispersion of a bead cache at 45-OK-18 (Jaehnig 1984b) showed that small artifacts from a single occupation surface can be displaced vertically as much as a meter in either direction. It is difficult to determine the extent of these disturbances; we will, however, consider their effects in the following discussion.

The graphics which accompany the discussion (Figures 7-2 through 7-6) are derived from computer generated distribution maps (Appendix E). The sample data was mapped by alphanumeric codes for nine divisions of the cumulative frequency class counts. Divisions were adjusted so that score ranges were overlapping and zero scores were always mapped as zero. The ninth division was further subdivided by use of letter codes for each score from highest to lowest. The interpretive graphics emphasize the locations of the letter codes and one or two of the highest frequency numeric codes. Units containing smaller amounts of cultural material are also mapped. Units that did not contain the zone or which were culturally sterile do not appear. Mean score, standard deviation, and sample size are also presented.

In each zone, we discuss the implications of features. Since these usually represent discernible concentrations of material defining surfaces and specilized activity areas, they reveal much about the nature of prehistoric settlement. Their locations also provide convenient geographic reference points. Perhaps the most conspicuous pattern is the orientation of activity in all zones to the beach front. The shift in the beach's location to the east in the upper zones as overbank deposits accumulated is reflected in the distribution of cultural material in Zones 2 and 3.

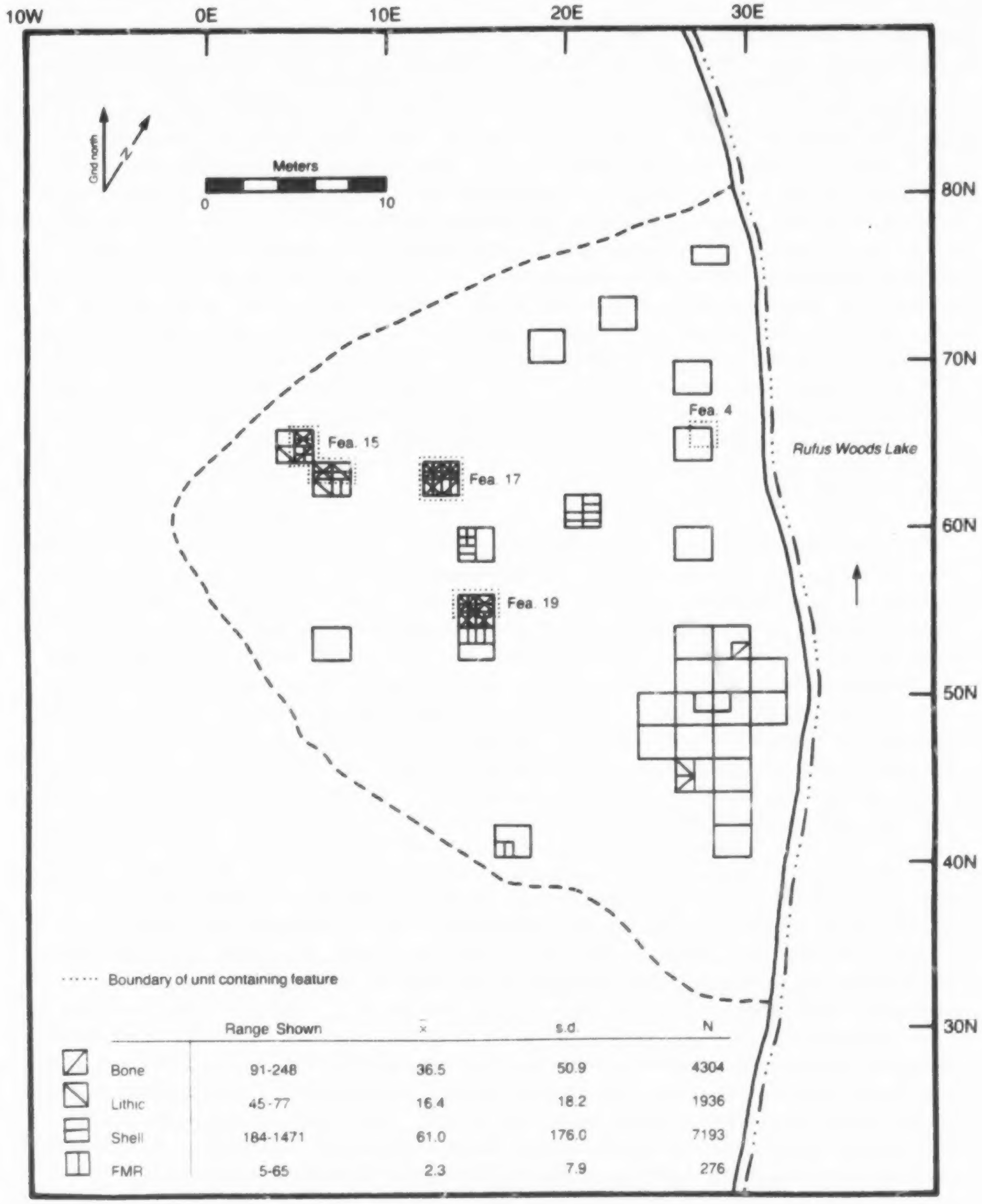
ZONE 4 (4000-2000 B.P.)

This zone includes four features--4, 15, 17 and 19. Our analysis of the features has defined them as an eroded hearth (Feature 4), a debris layer representing a food processing area (Feature 15), a midden or accumulation of surfaces (Feature 17), and a debris layer containing one or two hearths (Feature 19). The last three features were defined by analysis rather than during excavation.

There are three loci of activity in Zone 4 associated with Features 15, 17 and 19, characterized by high frequency densities of bone, FMR and shell (Figure 7-2). At least two more loci of lithics and bone unassociated with features occur in the block area. Two loci of shell and one of FMR are found outside of the block and features. Feature 4, an eroded hearth, has too little associated material to clarify its cultural significance.

The eight separate high fequency locations represent a diverse set of activities. The principal economic activities were the processing of shellfish and game. The featured concentrations reveal the use of both resources. The two areas in the block may represent the processing of bone and lithic reduction, while independent concentrations represent the processing of shellfish.

It is not possible to determine if the areas of concentration represent frequent discrete occupations with similar activities or isolated areas of activity within a smaller number of larger occupations. The absence of gravers, spokeshaves, scrapers and other specialized tools suggests little processing of bone, skins or other game by-products. An assemblage focused on hunting and representing an occupation of longer duration site use would be expected to include these tools. The relatively low frequencies of projectile points and bone, as well as the lack of well defined hearths, millingstones and anvil stones, also suggest short-term site use. The higher frequency of shell reflects the economic emphasis of the site. Judging from the number of cobble tools, it would appear they were used to process the shellfish. The


10W
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30E
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70N
60N
50N
40N
30N
Grid north
N
Meters
0
10
Fea. 15
Fea. 17
Fea. 19
Fea. 4
Rufus Woods Lake
······ Boundary of unit containing feature

		Range Shown	$\bar{x}$	s.d.	N
⧄	Bone	91-248	36.5	50.9	4304
⧅	Lithic	45-77	16.4	18.2	1936
⊟	Shell	184-1471	61.0	176.0	7193
◫	FMR	5-65	2.3	7.9	276

Figure 7-2. Distribution of cultural materials, Zone 4, 45-DO-214.

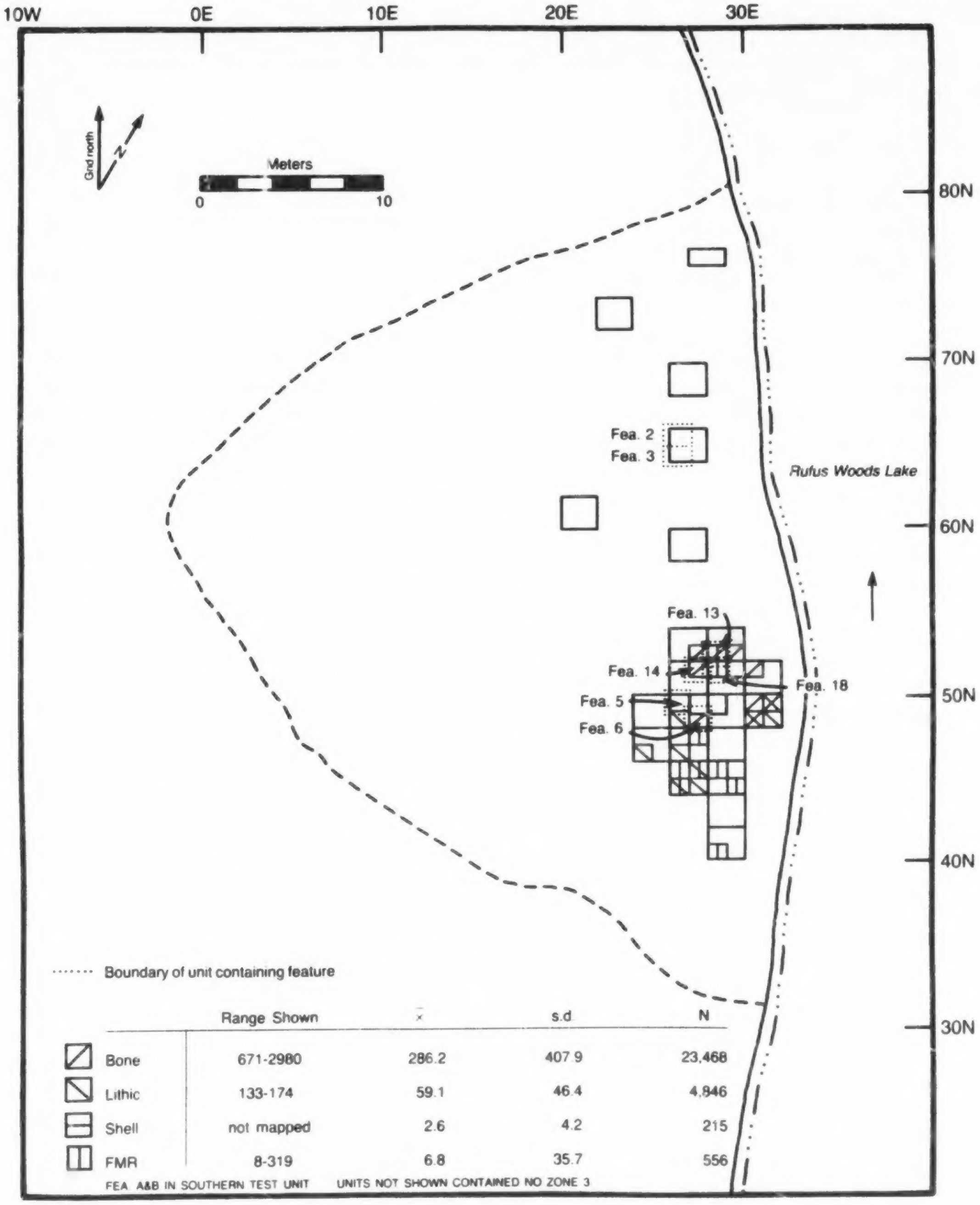
cobble tools also imply that the site occupants used the lithic material at hand. The zone represents short-term camps where local resources were procured and processed.

ZONE 3 (1200-1000 B.P.)

The discussion of artifact distribution in Zone 2 and in Zone 3 is focused on the block area where most of the cultural material was recovered. These zones are restricted to the eastern portion of the site.

There are nine features in Zone 3: Features A, B, 2, 3, 5, 6, 8, 13 and 14. Our analysis suggested that several are contemporaneous. Features 2 and 3, a cluster of unmodified rock and a firepit located north of the block area, were related to each other by proximity, stratigraphy and content. Feature 5, the cache, was related by location and botanical sample analyses to testing Features A, a carbon filled pit, and B, a carbon stained area containing FMR, burnt soil, fish and mammal bones. Owing to differences in analytic methods, we cannot include frequency data from the test unit excavation in this discussion. Feature 6, a concentration of burned bone fragments and other debris possibly representing a discrete activity area, also was related to Feature 5 by proximity. Features 8, 13, and 14, a hearth and two debris concentrations, cluster in the northern portion of the block. Features 2 and 3, located outside the block area, show no significant frequencies to distinguish them as specific kinds of activity areas.

The density distributions indicate four or five areas of activity within the block (Figure 7-3). The high frequency of bone associated with FMR in the northern area of Features 13, 14 and 8 suggests a single-purpose bone processing area near a hearth. The Feature 6 has units to the west and south with high densities of lithics and FMR associated with burned bone. The diversity of classes of material represented at this location differentiates it from the northern area. While there are intervening units without high frequencies between the locations, it is difficult for us to determine if the Feature 6 area represents a contemporaneous set of slightly different activities associated with the northern features. It may be that a separate hearth, associated with lithic manufacture and maintenance and food preparation, was located here. There are units to the south of Feature 6 with high frequencies of FMR and lithics and units to the east with bone and lithics. Adding information from the distribution of selected tool categories with relatively large sample sizes, we find the northern block features apparently even more restricted in their function (Figure 7-4). Projectile points, bifaces, tabular knives, and utilized flakes are more often associated with the concentrations south of the Feature 8, 13 and 14 area. The pattern seems to be one of specialization to the north and more generalized activities, especially lithic reduction, around the Feature 6 area. The concentration of tabular knives east of the test unit is difficult to explain. On the basis of a minor clustering of shell there and its proximity to the river, we suggest that the manufacture of cobble artifacts coupled with some shellfish processing occurred in this area.


10W
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Meters
0
10
Fea. 2
Fea. 3
Rufus Woods Lake
Fea. 13
Fea. 14
Fea. 18
Fea. 5
Fea. 6
······ Boundary of unit containing feature

		Range Shown	$\bar{x}$	s.d.	N
⧄	Bone	671-2980	286.2	407.9	23,468
⧅	Lithic	133-174	59.1	46.4	4,846
⊟	Shell	not mapped	2.6	4.2	215
◫	FMR	8-319	6.8	35.7	556

FEA. A&B IN SOUTHERN TEST UNIT UNITS NOT SHOWN CONTAINED NO ZONE 3

Figure 7-3. Distribution of cultural materials, Zone 3, 45-DO-214.

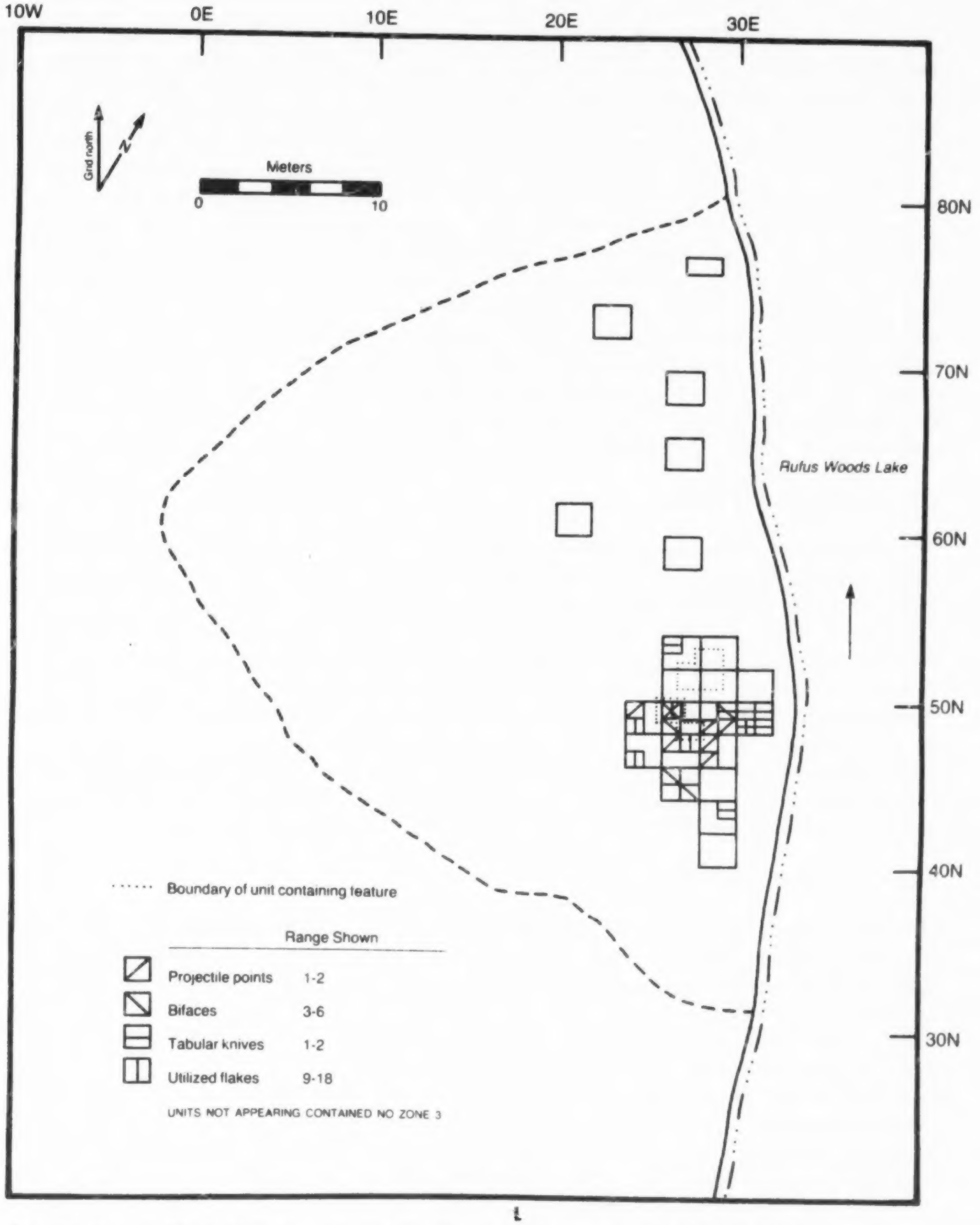

10W
0E
10E
20E
30E
Grid north
N
Meters
0
10
80N
70N
Rufus Woods Lake
60N
50N
40N
30N
Boundary of unit containing feature
Range Shown
Projectile points 1-2
Bifaces 3-6
Tabular knives 1-2
Utilized flakes 9-18
UNITS NOT APPEARING CONTAINED NO ZONE 3

Figure 7-4. Distribution of selected artifacts, Zone 3, 45-DO-214.

Though the density of cultural material is greater in Zone 3 than any of the other zones, it is more difficult to isolate activity areas and separate occupations. The greater amount of material comes from a much smaller horizontal area so that overlapping activities obscure discrete, specialized associations. The character of the assemblage and the seasonal data suggest multiple spring and summer occupations of longer duration and greater variety of activities than in Zone 4. The greater number of projectile points, specialized lithic tools including gravers and scrapers, the faunal remains, and hearth areas suggests hunting and fishing activities and the processing of game and game products. Both bone and woodworking activities are suggested by the presence of an adze, maul, abraders and high frequencies of worn debitage and by Feature 5 and its artifacts. Judging from the large numbers of bifaces, and re-sharpening, linear and waste flakes and the cores, it seems evident that lithic manufacture and maintenance were other activities. Feature 5 is evidence not only of fishing technology, but of at least one individual's intent to return to the site.

ZONE 2 (1200-1000 B.P.)

This zone contains three features, all within the block area. Feature 7 is a firepit, Feature 9 an earth oven, and Feature 16 a debris layer representing a surface and bone processing area.

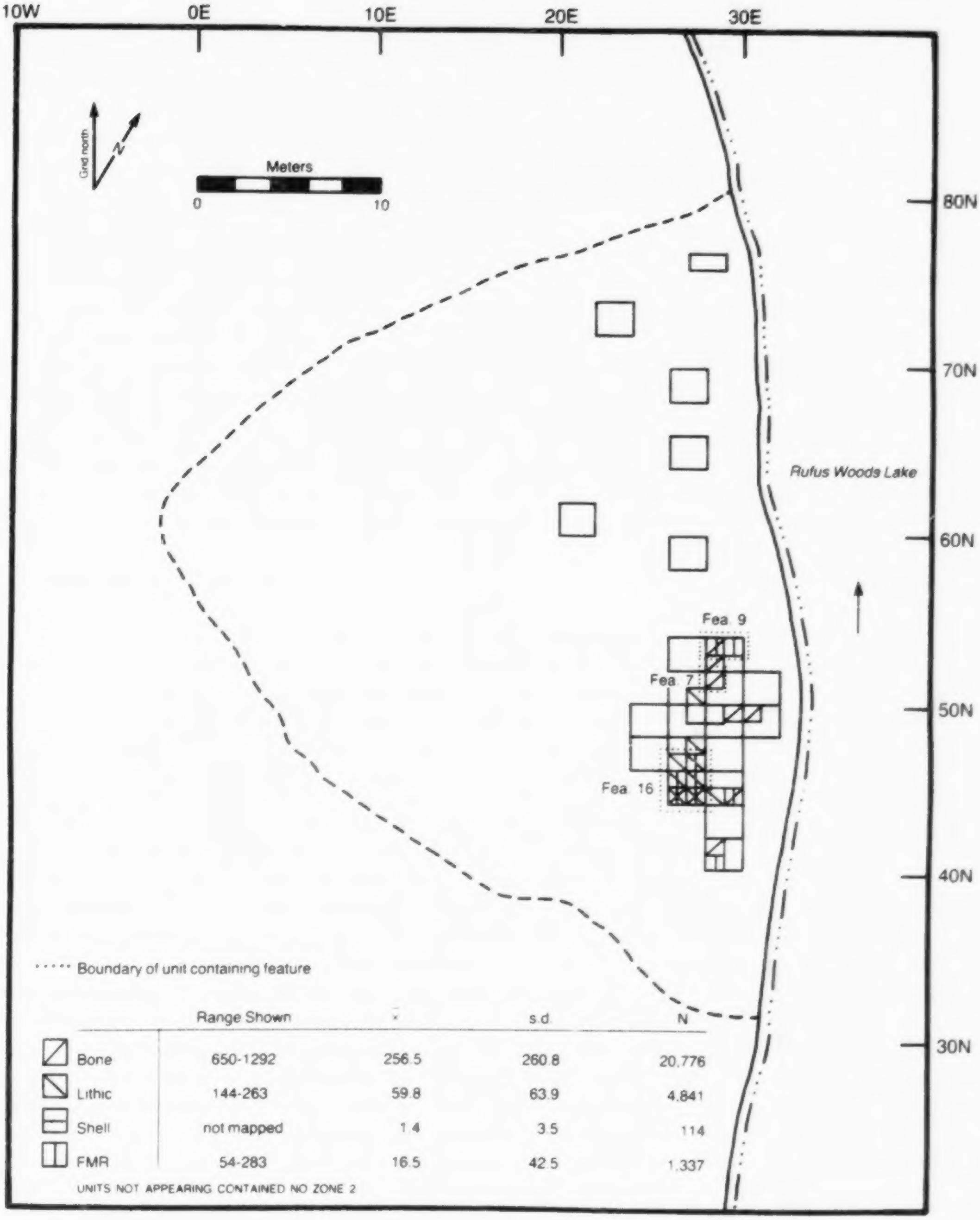
In this zone high lithic frequencies are associated with Features 7 and 16 (Figure 7-5). Bone occurs with all three features and suggests a fourth locus of processing activity at the south end of the block. FMR is similarly distributed. Feature 9 shows strong associations with bone and FMR and little with lithics.

Material distributions and their locations and the similar artifact assemblage indicate a continuation of the activities of Zone 3. Hunting and game processing continue to be the focus of activity.

ZONE 1 (1000 B.P.-Protohistoric)

The features of Zone 1 include two surface hearths (Features 1 and 12), a firepit (Feature 10), a concentration of unmodified rock (Feature 18) and a debris layer defining a surface (Feature 20). The last two features were defined in analysis. This zone overlies Zone 2 in the east and Zone 4 in the west. The features are located in eastern units. The distribution of shell foreshadows the underlying Zone 4 concentrations.

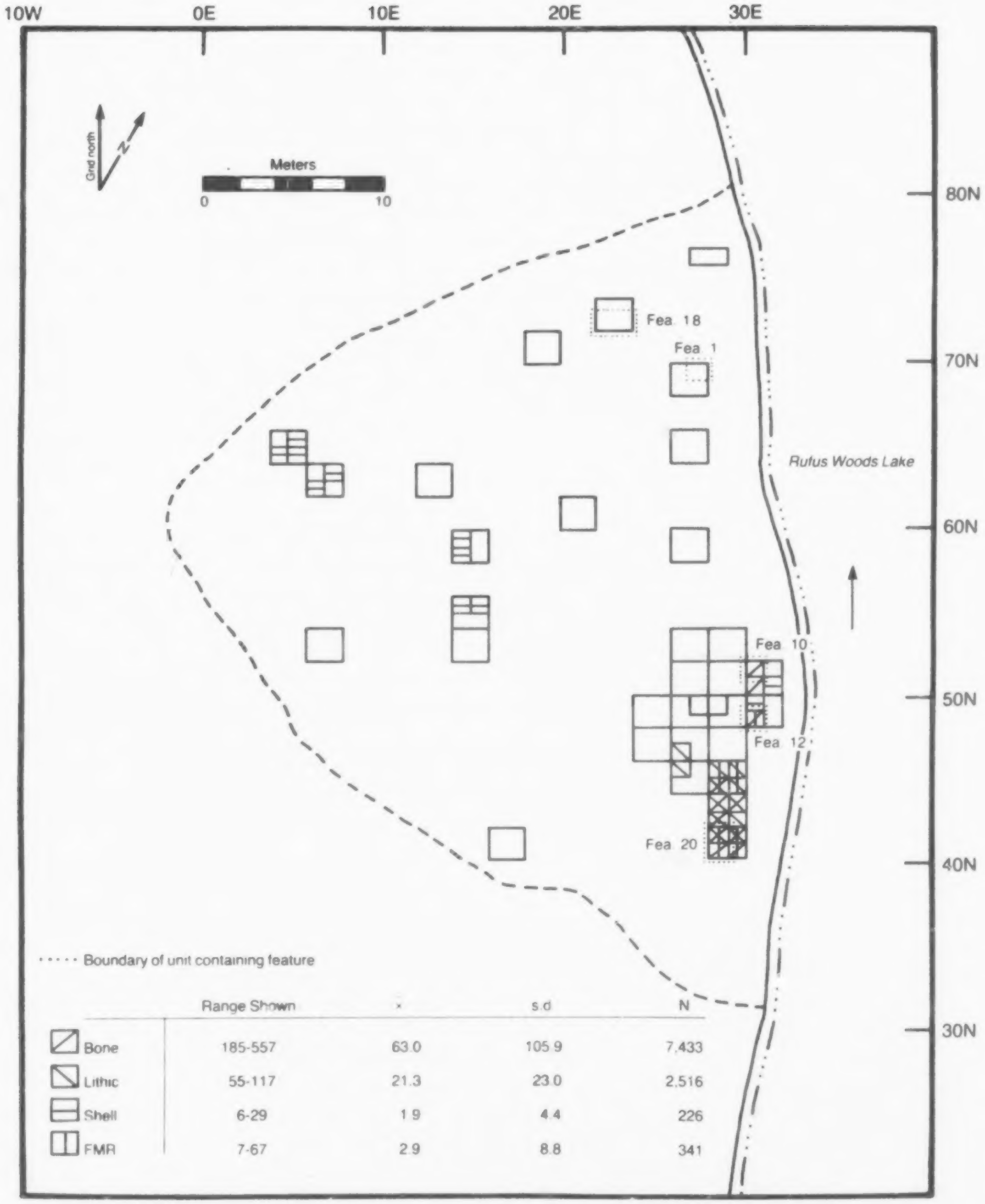
While the activities represented in Zone 1 are similar to those in the preceding zones, the features do not so sharply define centers of activity or surfaces (Figure 7-6). Only Feature 20 is associated with high concentrations of lithics, bone and FMR. Its boundaries may not have been sufficiently defined, and we may be witnessing a slight mixing with the underlying zone. However, the high frequencies of the southern block in this zone are offset to the east from the underlying Feature 16 concentrations. We may also interpret this area as evidence of activities around two separate hearths as indicated by the FMR distribution. The more northern area in 46N32E is associated with


10W
0E
10E
20E
30E
Grid north
N
Meters
0
10
80N
70N
60N
50N
40N
30N
Rufus Woods Lake
Fea. 9
Fea. 7
Fea. 16
····· Boundary of unit containing feature

	Range Shown	$\bar{x}$	s.d.	N
Bone	650-1292	256.5	260.8	20,776
Lithic	144-263	59.8	63.9	4,841
Shell	not mapped	1.4	3.5	114
FMR	54-283	16.5	42.5	1,337

UNITS NOT APPEARING CONTAINED NO ZONE 2

Figure 7-5. Distribution of cultural materials, Zone 2, 45-DO-214.


10W
0E
10E
20E
30E
80N
70N
60N
50N
40N
30N
Grid north
N
Meters
0
10
Fea 18
Fea 1
Rufus Woods Lake
Fea 10
Fea 12
Fea 20
····· Boundary of unit containing feature

	Range Shown	$\bar{x}$	s.d	N
⧄ Bone	185-557	63.0	105.9	7,433
⧅ Lithic	55-117	21.3	23.0	2,516
⊟ Shell	6-29	1.9	4.4	226
◫ FMR	7-67	2.9	8.8	341

Figure 7-6. Distribution of cultural materials, Zone 1, 45-DO-214.

high frequencies of lithics. It is separated from 42N32E and Feature 20 by units containing high frequencies of bone and lithics. The Feature 20 area shows association of FMR and bone: each area apparently represents different activities which may be contemporaneous.

Feature 10 shows some association with bone and shell, and Feature 12 with bone. Features 1 and 18 have no high frequencies of the major material classes. Feature 1 has lower frequencies of bone and FMR (Appendix E). Feature 18's associations remain unclear.

Occupation of 45-DO-214 during the last thousand years appears to have been more sporadic and of shorter duration than earlier occupations. Despite the long estimated time span, the density of cultural material is the lowest of the four zones (Table 2-2). This sparseness permits us to isolate some potential activity areas more easily. For instance, the FMR distribution shown in Appendix E suggests the presence of many separate hearths. That most of the FMR is not associated with high densities of other cultural materials supports the hypothesis of repeated, short duration visits to the site. As in Zone 4, the relatively few specialized lithic tools and unspecialized features do not suggest occupations of long duration. We conclude that 45-DO-214 functioned as a short-term summer campsite during the last thousand years.

SUMMARY AND CONCLUSIONS

Our analyses of cultural material from 45-DO-214 have shown continuity in processes of implement production and procurement of resources through the last 3,800 years. Variation, however, is also apparent. In Zone 4 shellfish is the primary resource for which we have evidence. After a hiatus in human use of approximately 800 years, the assemblages of Zones 2 and 3 show subsistence emphasis of the occupants was on hunting, game processing and fishing. Hunting remains the chief activity in Zone 1.

The depositional history shows that the Columbia River changed its course between the Zone 4 and Zone 3 occupations, cutting away the bank and then depositing new sediments at the site. This course change, or the conditions that caused it, may have destroyed the habitat of the shellfish gathered by the Zone 4 occupants. The greater emphasis in Zones 2 and 3 on hunting and fishing may represent decreased availability of the shellfish resource or it may represent the increased availability of game or greater dependence on fish in response to environmental or technological factors.

The sequence of occupations at 45-DO-214 shows some similarities to other regional archaeological findings. The temporal relationship of the zones to the sequences on the Middle and Upper Columbia are shown in Figure 3-19 (Nelson 1969; Grabert 1968; Chance and Chance 1982). Activities represented and the low density of cultural materials over a relatively long time span in Zone 4 correspond generally to Nelson's Frenchman Springs and Quilomene Bar Phases. These phases are characterized by seasonal hunting and gathering by a low density population with little evidence of winter village habitation or fishing (Nelson 1969, 1973). Recently, Chance has also characterized the Pre-Takumakst Period population at Kettle Falls as one of low density (Chance and Chance 1982).

A major change in site use occurred at 45-DO-214 between Zones 4 and 3. It is marked by an increase in use in Zones 3 and 2 and evidence of fishing with composite harpoons. This change corresponds both chronologically to other regional phases and to descriptions of the associated cultures. The Cayuse Phase, for instance, shows an increase in population density and establishment of the ethnographic winter village pattern, a change attributed to the development of more efficient fishing and storage technology (Nelson 1969, 1973). Similarly, Grabert (1968, 1970) describes a shift from generalized hunting and gathering in the Indian Dan Phase to increased use and preservation of riverine resources in the Chiliwist Phase. At Kettle Falls, the Sinaikst is the period of greatest population density, a phenomenon associated with the development of new fishing technology specific to the Falls. Fishing by other means had been important in earlier periods (Chance and Chance, 1982).

The assemblage of Zone 1 indicates intermittent short-term use over the past thousand years. This may be evidence of decreased population density as noted in the Shwayip Phase at Kettle Falls (Chance and Chance, 1982). More likely, however, the decrease in site use may be linked to the increased use of villages and a restructuring of subsistence patterns. In the most recent, protohistoric period, Euroamerican influences, most notably the horse, caused social and economic changes for groups throughout the Plateau (Anastasio 1972). These changes probably affected the latest prehistoric use of 45-DO-214 as well.

Certain interesting correspondences, then, do occur between the established regional sequences and that evident at 45-DO-214. Discrepancies come to light, however, when the site and the sequences are viewed from a project-wide perspective. Preliminary analysis indicates housepit components occur as early as the Kartar Phase, about 5500 B.P., in the project area. Housepits occur in all subsequent phases as well, although density of occupation decreases after the Kartar Phase and remains low until the Coyote Creek Phase. Evidence of fishing comes from all of the phases. The causal link between increased use of anadromous fish resources and the development of the village settlement pattern thus becomes questionable (e.g., Nelson 1969, 1973).

We may view the occupations of 45-DO-214 as further evidence of an established river-oriented settlement pattern. The site provides information about aspects of that pattern not associated with villages and structures. The cumulative analysis of all the project area sites should give us a more precise picture of that pattern and of the nature, causes, and extent of cultural change through time in the region.

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APPENDIX A:

RADIOCARBON DATE SAMPLES, 45-DO-214

Table A-1. Radiocarbon date samples, 45-DO-214.

Lab Sample #[1]	Zone	DU	Stratum	Unit	Level	Feature #	Material/gms	Radiocarbon Age (Years B.P.) T1/2=5730	Dendrocorrected Age[2] (Years B.P.)
TX-2896	3	IIIa	10	50N27E	110	1	Charcoal/5.5	1205±160	1151±168
	This date is from testing. Feature 1 (testing) is same as Feature 5 = artifact cache Sample = Douglas fir (Pseudotsuga menziesii), yellow pine, yew (Taxus), cedar/juniper. conifer cone, bitterbrush (Purshia) seed.								
TX-3392	3	IIIa	44	45N26E	120	-	Charcoal/30.9	1060±50	1048±60
TX-3393	3	IIIa	9	52N28E	110	8	Charcoal/26.4	1035±56	1022±64
	Feature 8 = eroded surface (?) hearth. No profiles available for this unit. The stratum assignment is based on extrapolation from closest walls.								
TX-3394	2	IIIb	5	54N28E	90	9	Charcoal/32.6	1190±50	1170±71
	Feature 9 = earth oven.								
TX-3395	3	IIIa	10	53N27E	120	-	Charcoal/44.1	1130±50	1112±71

[1] TX samples were dated by University of Texas-Austin, Radiocarbon Laboratory.

[2] Dendrocorrected according to Damon et al. (1974).

APPENDIX B:

ARTIFACT ASSEMBLAGE, 45-DO-214

Table B-1. Technological dimensions.

DIMENSION I: OBJECT TYPE

- Conchoidal flake
- Chunk
- Core
- Linear flake
- Unmodified
- Tabular flake
- Formed object
- Weathered
- Indeterminate

DIMENSION II: RAW MATERIAL*

- Jasper
- Chalcedony
- Petrified Wood
- Obsidian
- Quartzite
- Fine-grained quartzite
- Basalt
- Fine-grained basalt
- Granite
- Sandstone
- Siltstone
- Nephrite
- Bone/antler
- Ochre
- Shell

DIMENSION III: CONDITION

- Complete
- Proximal fragment
- Proximal flake
- Less than 1/4 inch
- Broken
- Indeterminate

DIMENSION IV: DORSAL TOPOGRAPHY

- None
- Partial cortex
- Complete cortex
- Indeterminate/not applicable

DIMENSION V: TREATMENT

- Definitely burned
- Dehydrated (heat treatment)

ATTRIBUTE I: WEIGHT

Recorded weight in grams

ATTRIBUTE II: LENGTH

Flakes: length is measured between the point of impact and the distal end along the bulbar axis

Other: length is taken as the longest dimension

ATTRIBUTE III: WIDTH

Flakes: width is measured at the widest point perpendicular to the bulbar axis

Other: width is taken as the maximum measurement along an axis perpendicular to the axis of length

ATTRIBUTE IV: THICKNESS

Flakes: thickness is taken at the thickest point on the object, excluding the bulb of percussion and the striking platform

Other: thickness is taken as the measurement perpendicular to the width measurement along an axis perpendicular to the axis of length

* Only those raw materials recorded from 45-DO-214 are listed here.

READEX FICHE

Table B-2. Size attributes of CCS conchoidal flakes by zone, 45-DO-214.

Attribute		Zone				Total
		1	2	3	4	
Length (mm)	$\bar{x}$	9.4	9.3	10.6	11.2	10.0
	s.d.	4.1	4.3	5.7	7.0	5.2
	N	750	1288	1305	520	3867
Width (mm)	$\bar{x}$	8.4	8.5	9.8	10.7	9.2
	s.d.	4.1	4.3	6.2	6.4	5.3
	N	752	1289	1304	520	3868
Thickness (mm)	$\bar{x}$	1.75	1.73	2.06	2.36	1.93
	s.d.	1.28	1.25	1.77	2.17	1.60
	N	750	1286	1303	520	3864
Length:Width Ratio		1.1	1.1	1.1	1.0	1.1

Table B-3. Size attributes of quartzite conchoidal flakes by zone, 45-DO-214.

Attribute		Zone				Total
		1	2	3	4	
Length (mm)	$\bar{x}$	16.8	10.6	16.3	19.5	16.3
	s.d.	4.8	6.9	16.1	15.1	13.7
	N	5	13	21	22	61
Width (mm)	$\bar{x}$	18.4	11.4	14.8	19.1	15.9
	s.d.	13.0	3.3	11.8	18.0	13.5
	N	5	13	21	22	61
Thickness (mm)	$\bar{x}$	2.74	2.28	3.33	4.33	3.41
	s.d.	0.75	1.37	3.34	3.03	2.83
	N	5	13	22	22	62
Length:Width Ratio		0.9	0.9	1.1	1.0	1.0

Table B-4. Size attributes of basalt conchoidal flakes by zone, 45-DO-214.

Attribute		Zone				Total
		1	2	3	4	
Length (mm)	$\bar{x}$	18.1	8.3	11.6	15.4	13.3
	s.d.	8.7	2.5	3.8	13.56	9.4
	N	8	10	14	17	49
Width (mm)	$\bar{x}$	19.3	11.4	13.8	13.3	14.0
	s.d.	11.6	8.1	10.9	10.8	10.5
	N	8	10	14	17	49
Thickness (mm)	$\bar{x}$	3.74	1.8	2.54	3.64	2.96
	s.d.	2.33	0.8	1.88	4.49	3.03
	N	8	10	14	17	49
Length:Width Ratio		0.9	0.7	0.8	1.2	1.0

Table B-5. Kinds of debitage by material type by zone, 45-DO-214.

Material	Zone				Total
	1	2	3	4	
Cryptocrystalline Silicas					
Conchoidal flakes	2,951	4,675	4,327	1,363	12,956
Tabular flakes	2	5	8	3	18
Quartzite					
Conchoidal flakes	22	39	49	47	157
Tabular flakes	136	221	238	202	797
Chunks	5	14	31	18	68
Basalt					
Conchoidal flakes	20	48	44	37	150
Tabular flakes	2	1	–	–	3
Chunks	2	4	11	2	19
Obsidian					
Conchoidal flakes	4	1	–	9	14
Granite					
Conchoidal flakes	–	–	1	1	2
Tabular flakes	2	–	–	–	2
Chunks	–	1	1	–	2
Sandstone					
Chunks	1	–	3	–	4
Indeterminate					
Conchoidal flakes	25	31	64	29	149
Tabular flakes	5	3	5	10	23
Chunks	9	8	16	13	46

Table B-6. Primary and secondary cryptocrystalline, quartzite and basalt debitage by zone, 45-DO-214.

Object Type	Zone				Total[1]
	1	2	3	4	
Cryptocrystalline					
Secondary: Flakes without Cortex	1,917	3,866	3,705	1,222	10,710
Primary: Flakes with Cortex and Chunks	141	250	332	145	868
Cortex Indeterminate	656	774	578	126	2,134
Subtotal	2,714	4,890	4,615	1,493	13,712
Quartzite					
Secondary: Flakes without Cortex	103	192	223	146	664
Primary: Flakes with Cortex and Chunks	25	36	56	71	188
Cortex Indeterminate	35	46	39	50	170
Subtotal	163	274	318	267	1,022
Basalt					
Secondary: Flakes without Cortex	20	41	38	30	129
Primary: Flakes with Cortex and Chunks	2	4	11	3	20
Cortex Indeterminate	2	8	6	6	22
Subtotal	24	53	55	39	171
TOTAL	2,901	5,217	4,988	1,799	14,905

[1] Does not include <1/4 in flakes and unassigned material.

Table B-7. Less than 1/4 inch flakes by material type and zone, 45-DO-214.

Material	Zone				Total
	1	2	3	4	
Jasper	503	623	448	67	1,641
Chalcedony	113	133	83	18	347
Petrified wood	7	13	10	3	33
Obsidian	4	1	–	9	14
Quartzite	8	32	17	5	62
Fine-grained quartzite	–	–	2	1	3
Basalt	–	1	2	–	3
Fine-grained basalt	–	2	3	1	6
Total	624	791	555	92	2,062

Table B-8. Count of condition by zone, 45-DO-214.

Condition	Zone				Total
	1	2	3	4	
Complete	201	384	470	206	1,261
Col %	80.4	77.4	82.9	78.9	80.1
Fragment	49	112	97	55	313
Col%	19.6	22.6	17.1	21.1	19.9
TOTAL	250	496	567	261	1,574

Table B-9. Functional dimensions.

DIMENSION I: UTILIZATION/MODIFICATION

None
Wear only
Manufacture only
Manufacture and wear
Modified/indeterminate
Indeterminate

DIMENSION II: TYPE OF MANUFACTURE

None
Chipping
Pecking
Grinding
Chipping and pecking
Chipping and grinding
Pecking and grinding
Chipping, pecking, grinding
Indeterminate/not applicable

DIMENSION III: MANUFACTURE DISPOSITION

None
Partial
Total
Indeterminate/not applicable

DIMENSION IV: WEAR CONDITION

None
Complete
Fragment

DIMENSION V: WEAR/MANUFACTURE RELATIONSHIP

None
Independent
Overlapping - total
Overlapping - partial
Independent - opposite
Indeterminate/not applicable

DIMENSION VI: KIND OF WEAR

Abrasion/grinding
Smoothing
Crushing/pecking
Polishing

DIMENSION VI: Continued

Feathered chipping
Feathered chipping/abrasion
Feathered chipping/smoothing
Feathered chipping/crushing
Feathered chipping/polishing
Hinged chipping
Hinged chipping/abrasion
Hinged chipping/smoothing
Hinged chipping/crushing
Hinged chipping/polishing
None

DIMENSION VII: LOCATION OF WEAR

Edge only
Unifacial edge
Bifacial edge
Point only
Point and unifacial edge
Point and bifacial edge
Point and any combination
Surface
Terminal surface
None

DIMENSION VIII: SHAPE OF WORN AREA

Not applicable
Convex
Concave
Straight
Point
Notch
Slightly convex
Slightly concave
Irregular

DIMENSION IX: ORIENTATION OF WEAR

Not applicable
Parallel
Oblique
Perpendicular
Diffuse
Indeterminate

DIMENSION X: OBJECT EDGE ANGLE

Actual edge angle

Table B-10. Type of manufacture by zone, 45-DO-214.

Type of manufacture	Zone				Total
	1	2	3	4	
None	125	213	216	97	651
Row %	19.2	32.7	33.2	14.9	
Col %	50.6	50.5	52.3	43.1	49.8
Total %	9.6	16.3	16.5	7.4	
Chipping	119	198	183	109	609
Row %	19.5	32.5	30.0	17.9	
Col %	48.2	46.9	44.3	48.4	46.6
Total %	9.1	15.1	14.0	8.3	
Grinding	0	0	3	1	4
Row %	0.0	0.0	75.0	25.0	
Col %	0.0	0.0	0.7	0.4	0.3
Total %	0.0	0.0	0.2	0.1	
Pecking and grinding	0	0	0	1	1
Row %	0.0	0.0	0.0	100.0	
Col %	0.0	0.0	0.0	0.4	0.1
Total %	0.0	0.0	0.0	0.1	
Indeterminate	3	11	11	17	42
Row %	7.1	26.2	26.2	40.5	
Col %	1.2	2.6	2.7	7.6	3.2
Total %	0.2	0.8	0.8	1.3	
TOTAL	247	422	413	225	1,307
Row %	18.9	32.3	31.6	17.2	

Table B-11. Orientation of wear by zone, 45-DO-214.

Orientation of wear	Zone				Total
	1	2	3	4	
Oblique	0	4	3	1	8
Col %	0.0	0.8	0.5	0.4	0.5
Perpendicular	244	471	540	218	1,473
Col %	97.6	95.0	95.2	83.5	93.6
Diffuse	0	1	2	1	4
Col %	0.0	0.2	0.4	0.4	0.3
Indeterminate	6	20	22	41	89
Col %	2.4	4.0	3.9	15.7	5.7
TOTAL	250	496	567	261	1,574

Examination of the wear types recorded for 45-DO-214 indicated that the divisions of the dimensions were unneccessarily fine. To facilitate analysis, certain categories were combined. The following list shows which categories were combined and Table 12 shows the distribution of the original categories by zone.

1. Kind of wear

   Smoothing: The following were included in the smoothing category on the premise that they result from similar sorts of activities. In the case of the feathered and hinged chipping, smoothing is the final result of use.
   - a. Abrasion/grinding
   - b. Feathered chipping and smoothing
   - c. Hinged chipping and smoothing

2. Location of wear

   Point:
   - a. Point only
   - b. Point, unifacial
   - c. Point and 2 edges

   Surface:
   - a. Surface
   - b. Terminal surface

3. Shape of worn area

   Convex:
   - a. Convex
   - b. Mildly convex

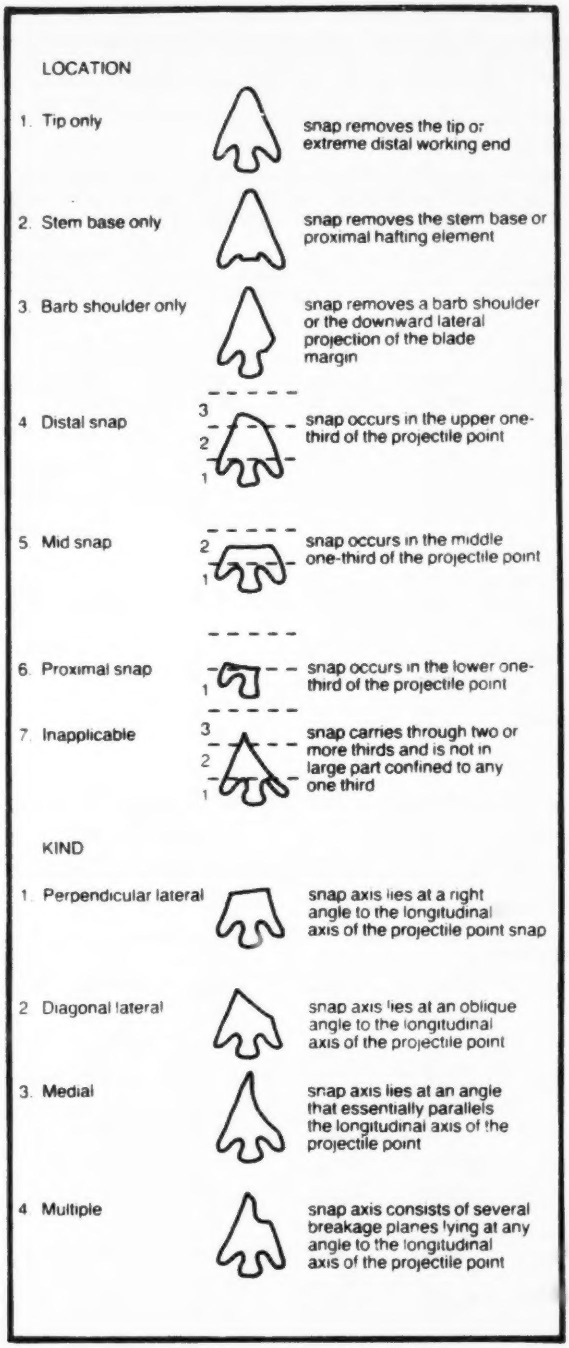
   Concave:
   - a. Concave
   - b. Mildly concave

Table B-12. Kind of wear, location of wear, and shape of ne, worn area by zone, 45-DO-214.

Kind of Wear	Zone				Total
	1	2	3	4	
Abrasion/grinding	0	1	0	0	1
Col %	0.0	0.2	0.0	0.0	0.1
Smoothing	8	24	18	46	96
Col %	3.2	4.8	3.2	17.6	6.1
Crushing/pecking	5	7	7	8	27
Col %	2.0	1.4	1.2	3.1	1.7
Polishing	0	0	2	1	3
Col %	0.0	0.0	0.4	0.4	0.2
Feathered chipping	197	395	457	182	1,231
Col %	78.8	79.6	80.6	69.7	78.2
Feathered chipping/ smoothing	7	19	19	3	48
Col %	2.8	3.8	3.4	1.1	3.0
Hinged chipping	32	47	55	20	154
Col %	12.8	9.5	9.7	7.7	9.8

Table B-12. Cont'd.

Kind of Wear	Zone				Total
	1	2	3	4	
Hinged chipping/ smoothing	1	3	9	1	14
Col %	0.4	0.6	1.6	0.4	0.9
TOTAL	250	496	567	261	1,574
Location of Wear					
Edge only	5	17	17	38	77
Col %	2.0	3.4	3.0	14.6	4.9
Unifacial edge	221	429	495	196	1,341
Col %	88.4	86.5	87.3	75.1	85.2
Bifacial edge	8	30	33	17	88
Col %	3.2	6.0	5.8	6.5	5.6
Point only	7	9	8	1	25
Col %	2.8	1.8	1.4	0.4	1.6
Point and unifacial edge	0	1	0	1	2
Col %	0.0	0.2	0.0	0.4	0.1
Point and bifacial edge	0	0	1	0	1
Col %	0.0	0.0	0.2	0.0	0.1
Point/two edges	7	3	5	1	16
Col %	2.8	0.6	0.9	0.4	1.0
Surface	0	2	3	0	5
Col %	0.0	0.4	0.5	0.0	0.3
Terminal surface	2	5	5	7	19
Col %	0.8	1.0	0.9	2.7	1.2
TOTAL	250	496	567	261	1,574
Shape of Worn Area					
Convex	48	118	153	54	373
Col %	19.2	23.8	27.0	20.7	23.7
Concave	29	63	56	28	176
Col %	11.6	12.7	9.9	10.7	11.2
Straight	68	125	122	78	393
Col %	27.2	25.2	21.5	29.9	25.0
Point	14	12	13	3	42
Col %	5.6	2.4	2.3	1.1	2.7
Slightly convex	62	133	155	73	423
Col %	24.8	26.8	27.3	28.0	26.9
Slightly concave	29	44	66	24	163
Col %	11.6	8.9	11.6	9.2	10.4
Irregular	0	1	2	1	4
Col %	0.0	0.2	0.4	0.4	0.3
TOTAL	250	496	567	261	1,574



LOCATION

1. Tip only	snap removes the tip or extreme distal working end
2. Stem base only	snap removes the stem base or proximal hafting element
3. Barb shoulder only	snap removes a barb shoulder or the downward lateral projection of the blade margin
4. Distal snap	snap occurs in the upper one-third of the projectile point
5. Mid snap	snap occurs in the middle one-third of the projectile point
6. Proximal snap	snap occurs in the lower one-third of the projectile point
7. Inapplicable	snap carries through two or more thirds and is not in large part confined to any one third

KIND

1. Perpendicular lateral	snap axis lies at a right angle to the longitudinal axis of the projectile point snap
2. Diagonal lateral	snap axis lies at an oblique angle to the longitudinal axis of the projectile point
3. Medial	snap axis lies at an angle that essentially parallels the longitudinal axis of the projectile point
4. Multiple	snap axis consists of several breakage planes lying at any angle to the longitudinal axis of the projectile point

Figure B-1. Breakage terminology illustrated. Not shown: Location (8)=reworked, Kind (5)=reworked.

Table B-13. Breakage location and kind by historical type, 45-DO-214.

Location	Distal one-third				Barb/Shoulder			Mid-blade					Proximal one-third		Not applicable			Reworked	Total
Kind	Perpendicular lateral	Diagonal lateral	Multiple	Reworked	Diagonal lateral	Medial	Reworked	Perpendicular lateral	Diagonal lateral	Medial	Multiple	Reworked	Diagonal lateral	Multiple	Diagonal lateral	Medial	Reworked	Reworked	
Cascade C.	–	1	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	2
Cold Springs Side-notched	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1
Shouldered Lanceolate	1	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	2
Nespelem Bar	–	–	–	–	–	–	–	–	–	–	1	–	1	–	–	–	1	–	3
Rabbit Island Stemmed A	1	1	–	–	–	–	1	1	–	–	–	–	–	1	–	–	–	–	5
Rabbit Island Stemmed B	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Quilomene Bar Corner-notched	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	–	–	2
Columbia Plateau Corner-notched A.	3	–	–	1	2	–	–	–	1	–	–	–	1	–	3	–	–	4	15
Columbia Plateau Corner-notched B.	2	–	–	–	1	–	–	–	1	–	–	–	2	–	2	–	1	2	11
Columbia Plateau Stemmed A.	–	–	–	–	–	–	1	–	–	–	–	–	1	–	–	–	–	–	2
Columbia Plateau Stemmed B.	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	2
Columbia Plateau Stemmed C.	1	–	–	–	4	–	–	–	–	–	–	–	3	–	–	1	–	2	11
Wallula Rectangular-Stemmed	–	–	–	–	1	–	–	1	–	–	1	–	–	–	–	–	–	1	4
Columbia Plateau Side-notched	1	1	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	1	5
Not Assigned	2	1	1	–	–	–	–	2	–	–	1	–	1	–	1	–	1	–	10
TOTAL	12	4	1	1	8	1	2	4	2	1	3	1	11	2	6	2	3	12	76

Table B-14. Dimensions of morphological projectile point classification.

DIMENSION I: BLADE-STEM JUNCTURE

N. Not separate
1. Side-notched
2. Shouldered
3. Squared
4. Barbed
9. Indeterminate

DIMENSION II: OUTLINE

N. Not applicable
1. Triangular
2. Lanceolate
9. Indeterminate

DIMENSION III: STEM EDGE ORIENTATION

N. Not applicable
1. Straight
2. Contracting
3. Expanding
9. Indeterminate

DIMENSION IV: SIZE

N. Not applicable
1. Large
2. Small

DIMENSION V: BASAL EDGE SHAPE

N. Not applicable
1. Straight
2. Convex
3. Concave
4. Point
5. 1 or 2 and notched
9. Indeterminate

DIMENSION VI: BLADE EDGE SHAPE

N. Not applicable
1. Straight
2. Excurvate
3. Incurvate
4. Reworked
9. Indeterminate

DIMENSION VII: CROSS SECTION

N. Not applicable
1. Planoconvex
2. Biconvex
3. Diamond
4. Trapezoidal
9. Indeterminate

DIMENSION VIII: SERRATION

N. Not applicable
1. Not serrated
2. Serrated
9. Indeterminate

DIMENSION IX: EDGE GRINDING

N. Not applicable
1. Not ground
2. Blade edge
3. Stem edge
9. Indeterminate

DIMENSION X: BASAL EDGE THINNING

N. Not applicable
1. Not thinned
2. Short flake scars
3. Long flake scars
9. Indeterminate

DIMENSION XI: FLAKE SCAR PATTERN

N. Not applicable
1. Variable
2. Uniform
3. Mixed
4. Collateral
5. Transverse
6. Other
9. Indeterminate

Table B-15. Complete morphological classification, projectile points, 45-DO-214.

Master #	Morphological class	Zone	Master #	Morphological class	Zone
255	N1N24221NN1	1	1412	1NN22111NN2	2
325	31929121NN1	1	1414	41321221NN1	2
337	41321121NN1	1	1447	31212121NN1	2
376	41321121NN1	1	1580	31322121NN1	2
398	41322911NN1	1	123	21222122NN1	3
665	31321121NN1	1	146	N1N11121NN2	3
762	1NN21111NN1	1	422	41322921NN1	3
900	1NN29121NN1	1	557	41312221NN1	3
928	31322121NN1	1	638	91315921NN1	3
944	41325921NN1	1	646	21329121NN1	3
1115	41322121NN1	1	680	31321121NN1	3
1116	31321121NN1	1	735	41325321NN1	3
1117	31321121NN1	1	738	31311141NN1	3
1131	N1N22121NN1	1	751	31322221NN1	3
1149	1NN25121NN1	1	762	N2NN4221111	3
1252	31222121NN1	1	792	31325221NN1	3
1281	41321121NN1	1	802	31322121NN1	3
133	21221111NN1	2	803	31315121NN1	3
136	21129221NN1	2	868	41222121NN1	3
174	41321921NN9	2	891	41121121NN1	3
329	N1N21121NN1	2	951	41121111NN1	3
409	41322311NN1	2	996	N1N22121NN1	3
525	1NN25221NN1	2	1035	N1N21111NN1	3
546	43213321NN1	2	1056	1NN11911NN1	3
571	N1N11121NN1	2	1064	N1N22121NN1	3
775	N1N22121NN1	2	1068	31212121NN1	3
822	N1N22121NN1	2	1102	1NN21921NN1	3
841	31321121NN2	2	1420	41329121NN3	3
846	N1N21111NN1	2	1432	N1N22221NN1	3
911	41121121NN1	2	1489	41325321NN1	3
913	1NN23121NN1	2	105	21221121NN1	4
966	41313921NN1	2	254	N1N12121NN1	4
980	41929121NN1	2	256	N2NN9221111	4
1081	21319121NN1	2	280	31212221NN1	4
1094	31321121NN1	2	1255	31212121NN1	4
1096	31329111NN1	2	1281	21222121NN1	4
1097	41329121NN1	2	1283	21229211NN1	4
1124	41322121NN1	2	1289	22NN2121131	4
1192	41321911NN1	2	1303	31221111NN1	4
1212	31323921NN1	2	1330	21222311NN1	4
			1368	N1N22211NN1	4

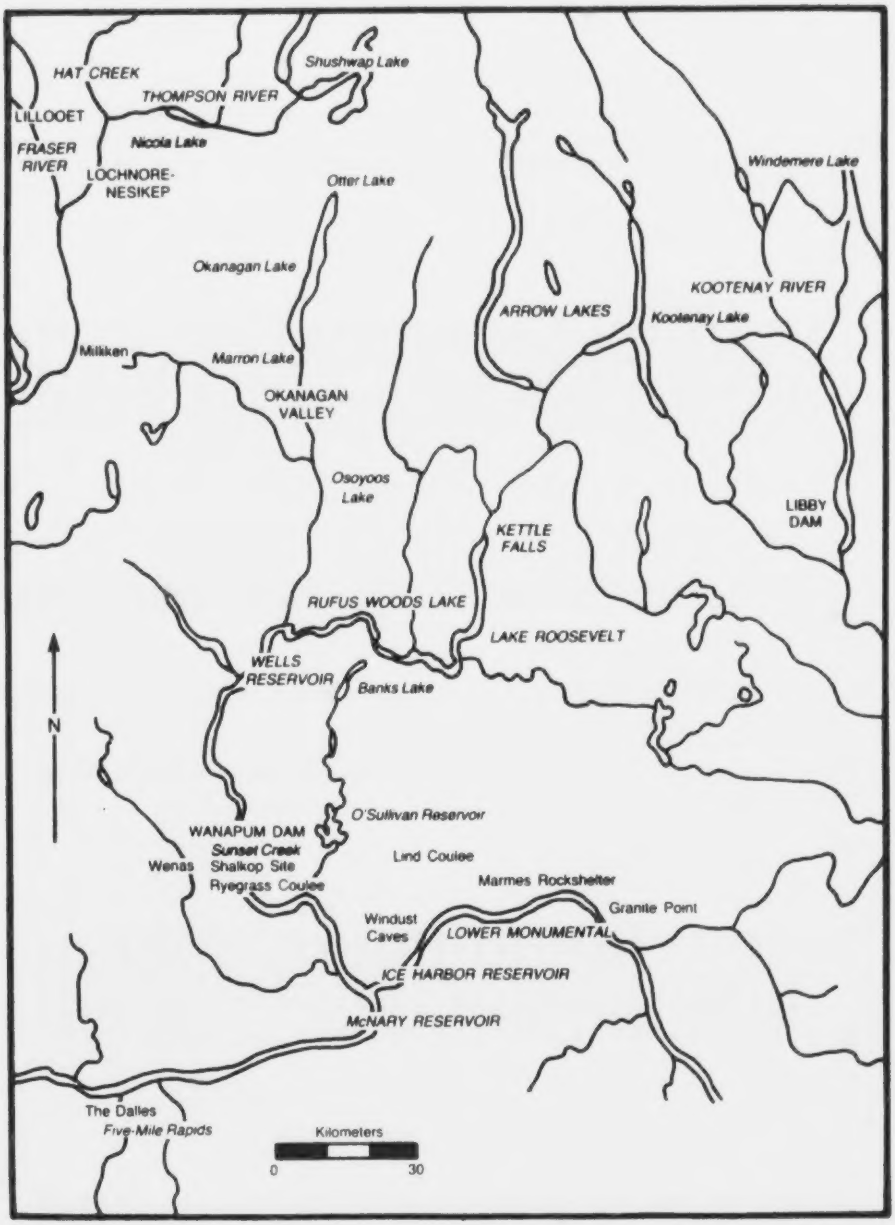
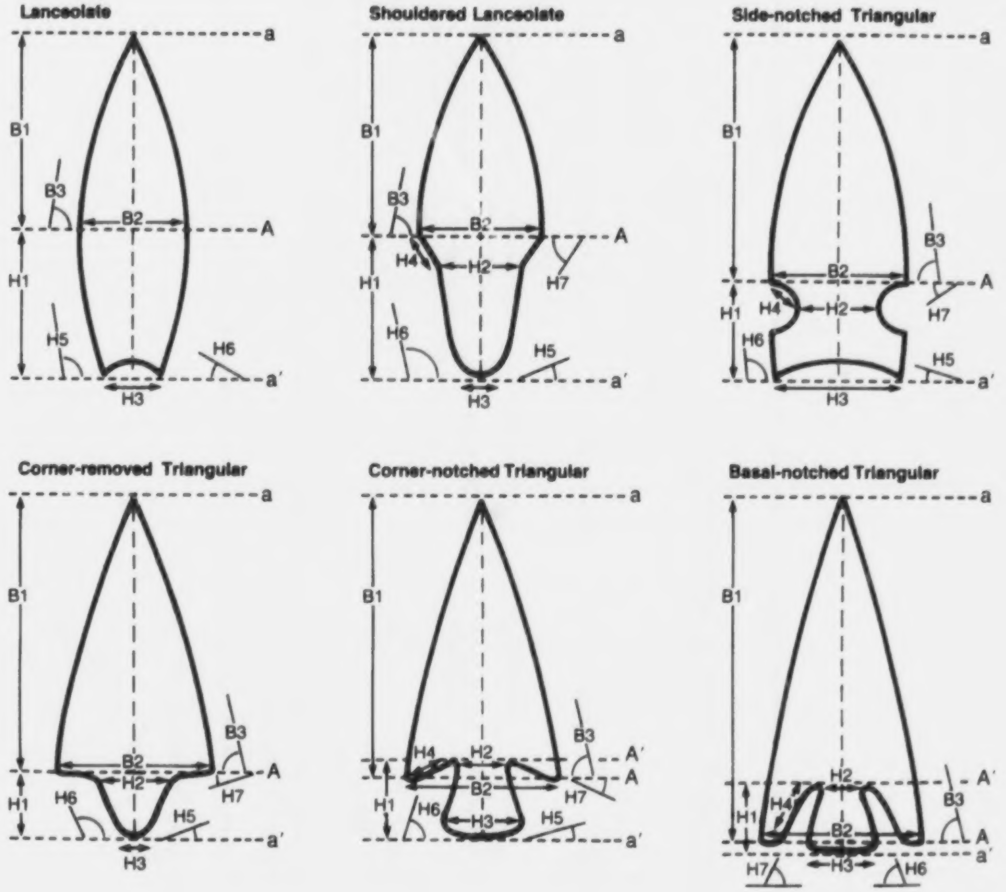

HAT CREEK
Shushwap Lake
THOMPSON RIVER
LILLOOET
Nicola Lake
FRASER RIVER
LOCHNORE-NESIKEP
Otter Lake
Windemere Lake
Okanagan Lake
KOOTENAY RIVER
ARROW LAKES
Kootenay Lake
Milliken
Marron Lake
OKANAGAN VALLEY
Osoyoos Lake
LIBBY DAM
KETTLE FALLS
RUFUS WOODS LAKE
LAKE ROOSEVELT
WELLS RESERVOIR
Banks Lake
N
O'Sullivan Reservoir
WANAPUM DAM
Sunset Creek
Wenas
Shalkop Site
Ryegrass Coulee
Lind Coulee
Marmes Rockshelter
Granite Point
Windust Caves
LOWER MONUMENTAL
ICE HARBOR RESERVOIR
McNARY RESERVOIR
The Dalles
Five-Mile Rapids
Kilometers
0
30

Figure B-2. Location of projectile point assemblages analyzed.


Lanceolate
Shouldered Lanceolate
Side-notched Triangular
Corner-removed Triangular
Corner-notched Triangular
Basal-notched Triangular
a
A
A'
a'
B1
B2
B3
H1
H2
H3
H4
H5
H6
H7

B1.	Blade Length
B2.	Blade Width
B3.	Blade Angle
H1.	Haft Length
H2.	Neck Width
H3.	Basal Width
H4.	Shoulder Length
H5.	Basal Angle
H6.	Basal Margin Angle
H7.	Shoulder Angle
R1.	Blade Length/Total Length
R2.	Neck Width/Basal Width
R3.	Basal Width/Blade Width
R4.	Notch Width/Shoulder Length
R5.	Notch Width/Basal Margin Length

Figure B-3. Location of digitized landmarks and measurement variables on projectile points.

HISTORICAL TYPE CLASSIFICATION

DIVISION	LANCEOLATE		TRIANGULAR			
SERIES	SIMPLE	SHOULDERED	SIDE-NOTCHED	CORNER-REMOVED	CORNER-NOTCHED	BASAL-NOTCHED
TYPE	11 LARGE LANCEOLATE	12 LIND COULEE	41 COLD SPRINGS	51 NESPELEM BAR	61 COLUMBIA A Corner-notched	71 QUILOMENE A Basal-notched
	15 WINDUST C Contracting base	13 WINDUST A	42 PLATEAU Side-notched	52 RABBIT ISLAND A	62 QUILOMENE Corner-notched	72 QUILOMENE B Basal-notched
		14 WINDUST B		53 RABBIT ISLAND B		
	21 CASCADE A	31 MAHKIN SHOULDERED			63 COLUMBIA B Corner-notched	73 COLUMBIA STEM A
	22 CASCADE B					74 COLUMBIA STEM B
	23 CASCADE C				64 WALLULA Rectangular stemmed	75 COLUMBIA STEM C

Types are numbered consecutively within formal series: a two-digit code indicates the approximate temporal sequence of defined series and types.

Type names are those most commonly applied: Mahkin Shouldered and Nespelem Bar are types defined for the Rufus Woods Lake project area.

Figure B-4. Historical projectile point type classification.

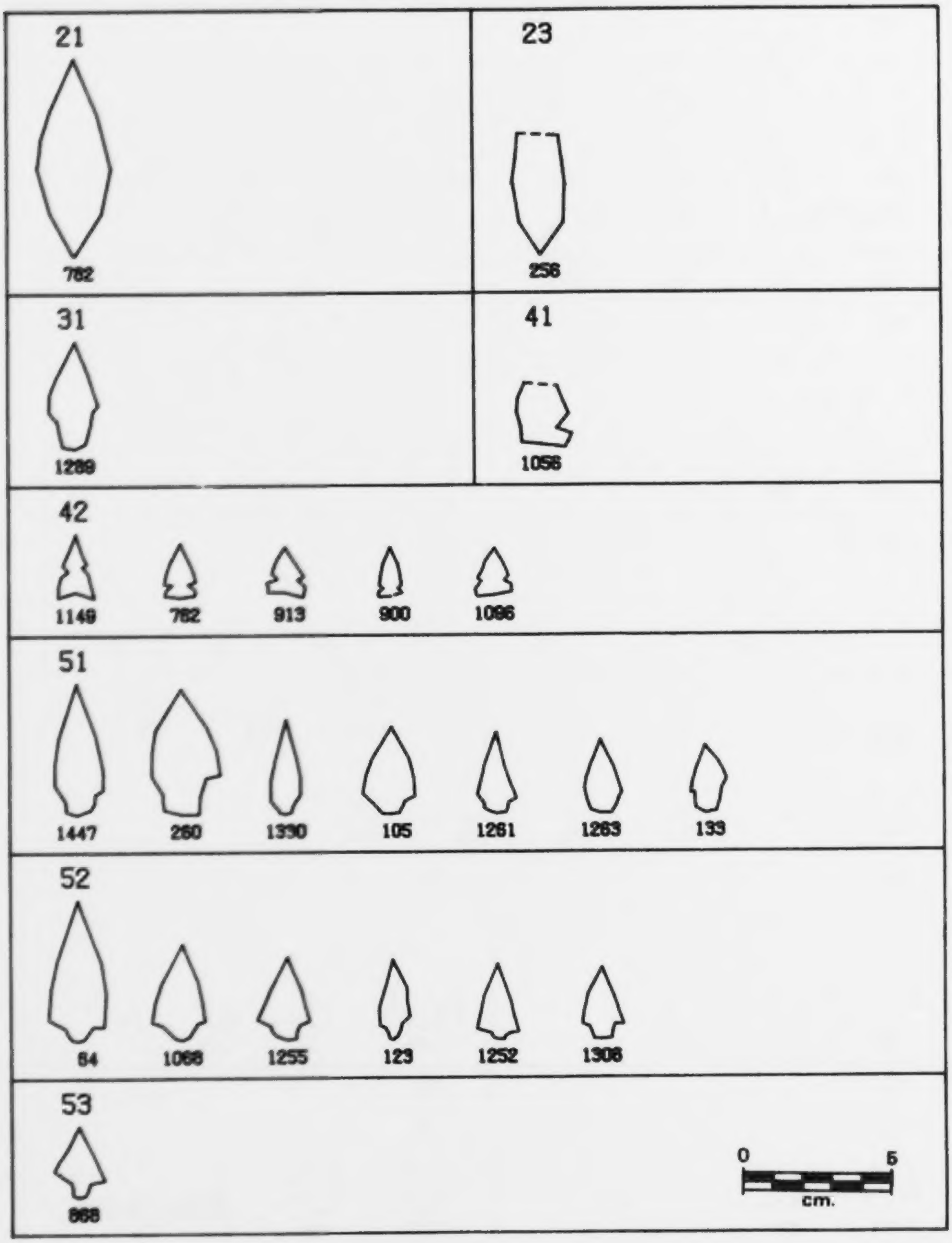

21
782
23
256
31
1289
41
1056
42
1149
782
913
900
1096
51
1447
260
1330
105
1261
1263
133
52
84
1068
1255
123
1252
1306
53
868
0
5
cm.

Figure B-5. Projectile point outlines from digitized measurements. Upper number is the historic type. Lower number is the master number.

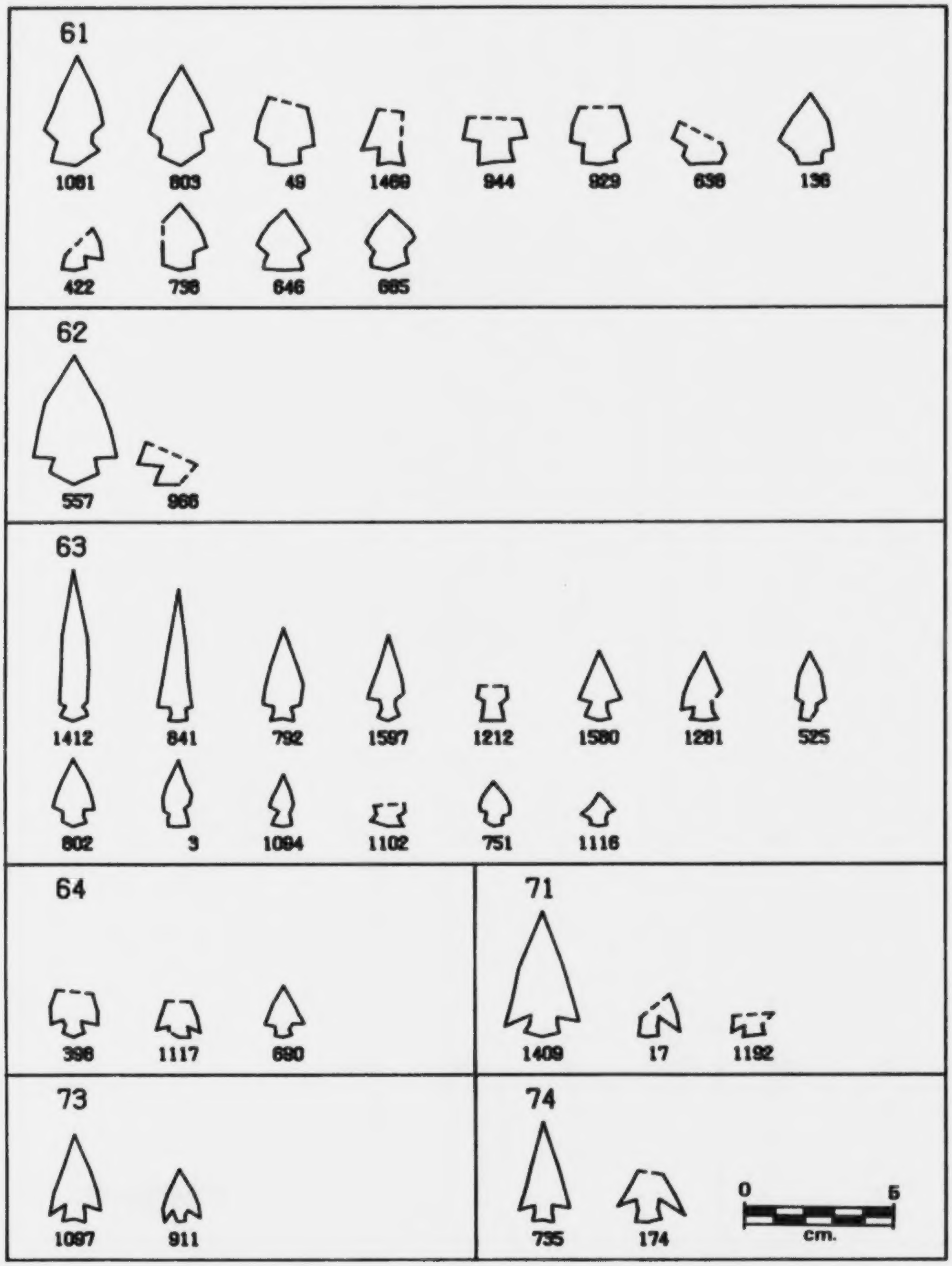

61
1081
803
49
1469
944
929
638
136
422
798
646
685
62
557
966
63
1412
841
792
1597
1212
1580
1281
525
802
3
1094
1102
751
1116
64
398
1117
690
71
1409
17
1192
73
1097
911
74
735
174
0
5
cm.

Figure B-5. Cont'd.

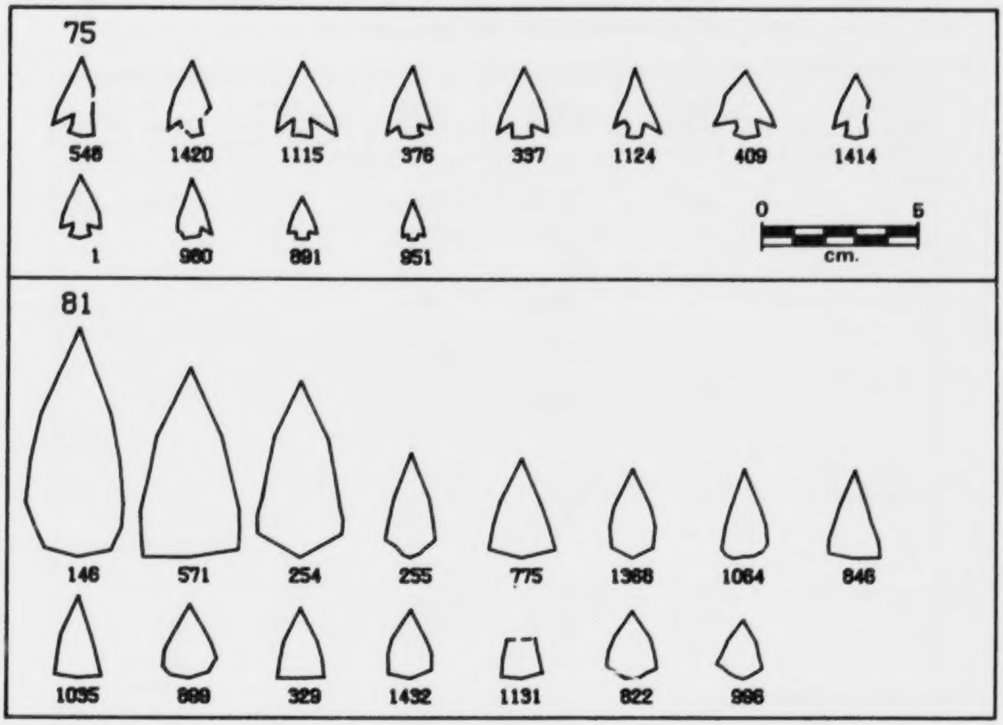

75
548
1420
1115
376
337
1124
409
1414
1
960
891
951
0
5
cm.
81
146
571
254
255
775
1368
1064
846
1035
889
329
1432
1131
822
996

Figure B-5. Cont'd.

Table B-16. Descriptive statistics for projectile points, 45-DO-214.

Historical Type	Blade Length	Haft Length	Neck Width	Ratio Neck Width: Basal Width	Ratio Blade Length: Total Length
Cascade A					
$\bar{x}$	360.0	301.0	124.0	–	0.5
s.d.	–	–	–	–	–
N	1	1	1	1	1
Cascade C					
$\bar{x}$	–	235.5	87.0	–	–
s.d.	–	–	–	–	–
N	–	1	1	1	–
Shouldered Lanceolate					
$\bar{x}$	223.5	133.5	62.0	0.6	0.6
s.d.	–	–	–	–	–
N	1	1	1	1	1
Cold Springs Side-notched					
$\bar{x}$	–	112.5	60.0	1.2	–
s.d.	–	–	–	–	–
N	–	1	1	1	–
Nespelem Bar					
$\bar{x}$	231.8	80.5	50.6	0.7	0.7
s.d.	72.1	26.1	12.7	0.1	0.1
N	7	7	7	7	7
Rabbit Island Stemmed A					
$\bar{x}$	214.3	55.3	42.4	0.5	0.8
s.d.	26.1	14.1	13.2	0.1	–
N	5	5	5	5	5
Rabbit Island Stemmed B					
$\bar{x}$	162.0	73.0	32.5	0.7	0.7
s.d.	–	–	–	–	–
N	1	1	1	1	1
Quilomene Bar Basal-notched					
$\bar{x}$	–	36.5	30.0	1.2	–
s.d.	–	–	–	–	–
N	–	1	1	1	–
Quilomene Bar Corner-notched					
$\bar{x}$	336.0	81.0	62.0	1.3	0.8
s.d.	–	15.6	7.1	0.1	–
N	1	2	2	2	1
Columbia Corner-notched A					
$\bar{x}$	164.6	83.5	51.2	1.1	0.6
s.d.	53.2	24.3	10.4	0.2	0.1
N	6	11	11	11	6
Columbia Corner-notched B					
$\bar{x}$	201.2	60.5	28.4	1.4	0.7
s.d.	124.4	11.2	4.8	0.3	0.1
N	10	12	12	12	10

Table B-16. Cont'd.

Historical Type	Blade Length	Haft Length	Neck Width	Ratio Neck Width: Basal Width	Ratio Blade Length: Total Length
Columbia Stemmed A					
$\bar{x}$	214.5	48.7	27.5	0.9	0.9
s.d.	64.3	13.8	3.5	0.5	0.1
N	2	2	2	2	2
Columbia Stemmed B					
$\bar{x}$	287.0	65.2	35.5	1.1	0.9
s.d.	–	13.1	7.8	0.1	–
N	1	2	2	2	1
Columbia Stemmed C					
$\bar{x}$	182.6	44.4	27.8	1.1	0.9
s.d.	39.1	16.2	5.3	0.2	–
N	11	11	11	11	11
Wallula Rectangular stemmed					
$\bar{x}$	128.6	45.3	31.0	1.1	0.7
s.d.	–	10.1	1.0	0.1	–
N	1	3	3	3	1
Plateau Side-notched					
$\bar{x}$	108.9	68.3	28.9	1.9	0.6
s.d.	17.4	27.6	6.1	0.5	0.1
N	5	5	5	5	5
Not Assigned					
$\bar{x}$	277.8	56.7	84.7	0.8	0.8
s.d.	114.9	59.2	34.1	0.4	0.1
N	13	15	15	15	13

Table B-17. Description of individual bone artifacts by class, 45-DO-214.

Class/Variant	Master #	Taxon/Element	Length[1] (cm)	Width[1] (cm)	Thickness[1] (cm)	Edge angle[2] (degrees)	Part in evidence	Surface condition	Feature	Zone
Shaped, Identifiable										
Harpoon valve										
Double socket	1497	Cervid/Antler	5.7	1.2	0.8	–	Most	Eroded	5	3
Single socket	1514	Cervid/Antler	4.9	0.9	0.5	–	Most	Eroded	5	3
	1556	Cervid/Antler	6.6[3]	1.0[3]	0.6[3]	–	All	Preform	5	3
Valved unipoint	1532	Cervid/Antler	9.3	0.9	0.6	30	Most	Eroded	5	3
Unipoint	1472	Indeterminate	6.5	0.9	0.7	15	All	Eroded/Burned	–	3
	(1207 1230)[4]	Indeterminate	5.1	0.8	0.6	15	All	Polish/Stria	–	2
	1415	Indeterminate	5.0	0.6	0.5	15	All	Stria	–	2
	991	Indeterminate	4.9	0.7	0.7	15	All	Stria	–	3
	1427	Indeterminate	2.7	0.5	0.4	15	All	Smooth	–	3
	1547	Indeterminate	2.8	0.5	0.5	15	All	Smooth	5	3
	1506	Indeterminate	8.7	0.8	0.6	15	All	Eroded	5	3
Round section bipoint	1535	Indeterminate	6.6[3]	0.4	0.4	5	3/4	Smooth	5	3
	(1544 1527)[4]	Indeterminate	8.0	0.4	0.4	5	All	Smooth	5	3
	1543	Indeterminate	6.8	0.4	0.4	5	All	Smooth	5	3
Flat section point	1110	Indeterminate	2.3	0.3	0.2	5	Most	Smooth	7	3
	1479	Indeterminate	1.9	0.5	0.2	15	End	Smooth	–	2
	1501	Indeterminate	4.2	0.5	0.3	15	Most	Smooth	5	3
Awl										
Metapodial	1431	Cervid/Metapodial	3.6[3]	1.3[3]	0.5	20	Distal end	Polish/stria	–	3
	908	Cervid/Metapodial	2.6[3]	0.9[3]	0.4	10	Distal end	Polish/ Burned	–	1
Rib	478	Indeterminate/Rib	7.8[3]	0.9	0.5	10	Half	Polish/Stria	–	3
Longbone	1377	Indeterminate/ Long bone	16.5	1.2	0.8	10	All	Eroded	–	3
Handle	1492	Cervid/Antler	14.0	1.5	1.5	–	All	Incised/Burned	5	3
Wedge	541	Cervid/Antler	11.4[3]	2.9	2.9	–	3/4	Fragment/Burned	16	2
	1581	Cervid/Antler	14.4	3.7	3.7	60	3/4	Fragment/Burned	16	2
	561	Cervid/Antler	21.6[3]	3.9	3.9	–	Most	Fragment	16	2
Bone bead										
Cylindrical	1559	Indeterminate	0.4[3]	0.5[3]	0.5[3]	–	Half	Indeterminate/ Burned	5	3
	1466	Bird/Long bone	2.7	0.5	0.5	–	Most	Smooth	–	3
	551	Bird/Long bone	0.8[3]	0.5[3]	0.5[3]	–	Fragment	Smooth/Incised	–	3
Square	1515	Indeterminate	2.4	1.0[3]	1.0[3]	–	Half	Smooth	5	3
	(1554 1558)[4]	Indeterminate	6.5	1.8	1.8	–	Half	Preform	5	3
	1570	Indeterminate	2.1	-.-	-.-	–	Fragment	Smooth	5	3

Table B-17. Cont'd.

Class/Variant	Master #	Taxon/Element	Length[1] (cm)	Width[1] (cm)	Thickness[1] (cm)	Edge angle[2] (degrees)	Part in evidence	Surface condition	Feature	Zone
Shaped, Unidentifiable Remnants										
Proximal end, Metapodial	1066	Cervid/Metapodial	10.0[3]	1.2	0.9	–	Proximal end	Smooth	–	3
	1539	Cervid/Metapodial	7.4[3]	1.4	1.2	–	Proximal end	Eroded	5	3
	(1135 1136)[4]	Cervid/Metapodial	6.9	1.8	0.7	–	Proximal end	Smooth	–	1
	(1523 1530)[4]	Cervid/Metapodial	21.5[3]	1.50	1.27	–	Most	Preform	5	3
Pointed end fragment										
Round section	(1095								–	2
	1087)[4]	Indeterminate	2.9[3]	0.6[3]	0.5[3]	10	Tip	Smooth	–	3
	1244	Indeterminate	1.0[3]	0.3[3]	0.2[3]	5	Tip	Smooth	–	3
Oval section	1513	Indeterminate	5.9[3]	0.9[3]	0.7[3]	15	Tip	Eroded	5	3
	1525	Indeterminate	3.3[3]	1.0[3]	0.7[3]	15	Tip	Eroded	5	3
Flat section	1524	Indeterminate	6.4[3]	1.2[3]	0.5[3]	20	Distal end	Eroded	5	3
Square section	1120	Indeterminate	1.5[3]	0.5[3]	0.5[3]	–	Tip	Smooth	–	1
	1335	Indeterminate	2.2[3]	0.6[3]	0.5[3]	10	Tip	Smooth	17	4
Squared end fragment	1519	Indeterminate	7.4[3]	1.3	0.5	–	Proximal end	Eroded	5	3
	1531	Indeterminate	5.9[3]	1.0	0.7	–	Proximal end	Eroded	5	3
Blunted end fragment	1509	Indeterminate	6.7[3]	0.9	0.5	–	Distal end	Smooth	5	3
	1545	Indeterminate	4.4[3]	1.0	0.7	–	Distal end	Smooth	5	3
Shaft fragment, No ends	1550	Indeterminate	–.–	–.–	–.–	–	Shaft	Smooth	5	3
	1551	Indeterminate	–.–	–.–	–.–	–	Shaft	Smooth	5	3
Other fragment	1419	Indeterminate	3.0[3]	1.7	–.–	–	Fragment	Eroded	–	3
	(1567 1572)[4]	Cervid/Antler	7.8[3]	1.4	–.–	–	Fragment	Eroded	5	3

Table B-17. Cont'd.

Class/Variant	Master #	Taxon/Element	Length[1] (cm)	Width[1] (cm)	Thickness[1] (cm)	Edge angle[2] (degrees)	Part in evidence	Surface condition	Feature	Zone
Partial Modificaton, No Shape Evident										
Technological modification only	1510	Indeterminate					Shaft	Flaked	5	3
	1086	Indeterminate					Fragment	Polish/Stria	–	3
	1429	Indeterminate					Fragment	Polish/Stria	–	3
	1512	Indeterminate					Fragment	Polish/Stria	5	3
	1428	Indeterminate					Fragment	Polish/Stria	–	3
	1039	Indeterminate					Fragment	Polish/Stria	–	1
	1598	Indeterminate					Fragment	Polish/Stria	A	2
	70	Indeterminate					Fragment	Polish/Stria	–	3
	1574	Indeterminate/ Long bone					Fragment	Polish/Stria	5	3
	(1564 1565)[4]	Indeterminate/ Long bone					Fragment	Polish/Stria	5	3
	1435	Indeterminate					Fragment	Smooth	–	3
	1009	Indeterminate					Fragment	Smooth	–	3
	1540	Indeterminate					Fragment	Grooved	5	3
	1508	Bird/Long bone	17.8	1.4	1.4		Shaft	Grooved	5	3
	1548	Deer sized/Tibia	12.7	2.5	0.2		Shaft	Grooved	5	3
	1521	Deer sized/Tibia	7.0	2.4	1.5		Shaft	Grooved	5	3
	1561	Indeterminate					Fragment	Grooved	5	3
	1562	Indeterminate					Fragment	Grooved	5	3
	1563	Indeterminate					Fragment	Grooved	5	3
	1568	Indeterminate					Fragment	Grooved	5	3
	1569	Indeterminate					Fragment	Grooved	5	3
	1572	Indeterminate					Fragment	Grooved	5	3
Wear only	1571	Indeterminate					Shaft	Polish	5	3
	1511	Indeterminate					Shaft	Polish	5	3

[1] Measurement at point of maximum dimension.
[2] Measured at distal (working) tip or edge.
[3] Specimen not complete in this dimension.
[4] Previously numbered conjoinable parts.

APPENDIX C:

FAUNAL ASSEMBLAGE, 45-DO-214

Family Leporidae

Lepus cf. *townsendii*

Zone 1: 2 mandible fragments.
Zone 3: 1 innominate fragment, 1 radius fragment.

Sylvilagus nuttallii

Zone 3: 1 tibia fragment.

Family Sciuridae

Marmota flaviventris

Zone 2: 6 molars, 1 mandible fragment, 1 humerus fragment, 2 scapula fragments, 1 ulna.
Zone 3: 3 humerus fragments, 1 radius fragment, 2 ulnas, 1 ulna fragment, 1 incisor, 1 first phalanx, 1 calcaneus, 1 mandible fragment.
Zone 4: 18 mandible fragments, 1 humerus fragment, 2 incisor fragments, 6 molars, 1 maxilla fragment, 1 radius fragment, 1 scapula fragment, 1 tibia.

Spermophilus sp.

Zone 2: 1 mandible fragment, 2 maxilla fragments.
Zone 3: 3 humeri, 1 mandible fragment, 1 tibia.
Zone 4: 1 mandible, 21 mandible fragments, 6 maxilla, 3 maxilla fragments.

Spermophilus washingtoni

Zone 1: 1 mandible fragment.
Zone 3: 1 mandible, 2 mandible fragments, 1 skull.
Zone 4: 10 mandibles, 12 mandible fragments.

Family Geomyidae

Thomomys talpoides

Zone 1: 3 femurs, 1 femur fragment, 4 mandible fragments, 1 humerus, 1 ulna, 1 tibia, 1 skull.
Zone 2: 2 mandibles, 3 mandible fragments, 1 femur, 1 femur fragment, 1 humerus fragment, 1 innominate, 1 scapula, 1 maxilla, 1 maxilla fragment, 1 skull fragment, 2 tibia.
Zone 3: 1 mandible fragment, 1 femur, 1 humerus, 1 humerus fragment, 2 maxilla fragments, 1 pelvis.
Zone 4: 3 mandibles, 26 mandible fragments, 8 femurs, 1 femur fragment, 10 humeri, 4 humerus fragments, 1 innominate, 6 maxilla fragments, 1 skull, 3 skull fragments, 1 scapula, 3 tibiae, 1 ulna.

Family Heteromyidae

Perognathus parvus

Zone 1: 4 femurs, 1 maxilla, 1 skull fragment, 1 mandible fragment, 1 tibia.
Zone 2: 3 femurs, 2 humeri, 2 innominate, 3 mandibles, 1 mandible fragment, 1 scapula, 1 skull, 1 skull fragment, 2 tibia, 1 maxilla fragment, 1 sacrum.
Zone 3: 1 humerus, 2 mandible fragments, 3 maxillae, 2 maxilla fragments, 1 skull, 1 skull fragment.
Zone 4: 2 mandibles, 2 mandible fragments, 1 skull, 3 femurs, 1 tibia.

Family Castoridae

Castor canadensis

Zone 3: 1 incisor fragment, 3 molars, 1 P^4.

Family Cricetidae

Zone 3: 2 inominates, 1 tibia.

Peromyscus maniculatus

Zone 2: 1 innominate, 3 mandibles.
Zone 4: 1 mandible, 1 maxilla.

Microtus sp.

Zone 2: 1 mandible, 3 mandible fragments, 1 maxilla, 1 skull, 1 skull fragment.
Zone 3: 1 skull, 1 skull fragment, 1 mandible, 2 mandible fragments.

Lagurus curtatus

Zone 1: 1 mandible, 3 mandible fragments, 1 maxilla fragment.
Zone 2: 4 mandible fragments.
Zone 3: 7 mandible fragments, 1 skull fragment.
Zone 4: 5 mandible fragments, 1 skull.

Ondatra zibethicus

Zone 1: 1 tibia fragment.

Family Canidae

Canis spp.

Zone 2: 1 radius fragment, 1 third phalanx.

Family Mustelidae

Taxidea taxus

Zone 3: 1 mandible fragment

Family Cervidae

Zone 2: 3 antler fragments.
Zone 3: 2 antler fragments.

Cervus elaphus

Zone 3: 1 second phalanx fragment.
Zone 4: 1 second phalanx fragment.

Ododoileus spp.

Zone 1: 1 incisor, 1 molar fragment, 1 carpal, 1 phalanx, 4 phalanx fragments.
Zone 2: 1 skull fragment, 6 mandible fragments, 3 incisors, 2 premolars, 7 molars, 2 molar fragments, 1 humerus fragment, 4 radius fragments, 6 carpals, 2 metacarpal fragments, 2 tibia fragments, 1 astragalus, 1 tarsal, 2 metatarsal fragments, 6 phalanges, 26 phalanx fragments.

Zone 3: 5 antler fragments, 2 skull fragments, 6 mandible fragments, 2 incisors, 6 premolars, 3 molars, 6 molar fragments, 3 scapula fragments, 1 humerus fragment, 3 radius fragments, 2 ulna fragments, 12 carpals, 2 metacarpal fragments, 1 tibia fragment, 3 astragalus fragments, 2 calcaneus fragments, 1 tarsal, 4 metatarsal fragments, 6 metapodial fragments, 2 phalanges, 16 phalanx fragments.
Zone 4: 2 skull fragments, 1 mandible fragment, 1 incisor, 1 premolar, 3 molars, 1 astragalus, 1 phalanx, 2 phalanx fragments.

Odocoileus virginianus

Zone 3: 1 antler fragment.

Family Bovidae

Antilocapra americana

Zone 1: 1 molar fragment.
Zone 2: 2 mandible fragments, 2 molars, 1 astragalus fragment, 1 calcaneus fragment, 5 metapodial fragments, 1 metatarsal fragment.
Zone 3: 1 mandible fragment, 3 molars, 4 molar fragments, 2 scapula fragments, 7 radius fragments, 1 ulna fragment, 1 carpal, 1 tibia fragment, 2 metapodial fragments.

Bos/Bison

Zone 1: 1 phalanx fragment.
Zone 2: 1 molar fragment.
Zone 4: 1 metatarsal fragment.

Ovis canadensis

Zone 1: 1 metatarsal fragment, 1 metapodial fragment, 1 phalanx fragment.
Zone 2: 5 incisors, 1 molar, 1 molar fragment, 1 humerus fragment, 1 phalanx, 5 phalanx fragments.
Zone 3: 2 incisors, 1 molar, 2 molar fragments, 1 scapula fragment, 1 tibia fragment, 2 calcaneus fragments, 4 metapodial fragments, 2 phalanges, 2 phalanx fragments.
Zone 4: 1 metapodial fragment, 1 phalanx fragment.

Deer-Sized

Zone 1: 2 skull fragments, 1 axis vertebra fragment, 2 lumbar vertebra fragments, 1 rib fragment, 1 carpal, 1 carpal fragment, 1 innominate fragment, 1 astragalus fragment, 2 tarsals, 1 metatarsal fragment, 1 phalanx fragment, 2 sesamoids.

Zone 2: 2 skull fragments, 2 mandible fragments, 1 atlas vertebra fragment, 3 axis vertebra fragments, 1 cervical vertebra fragment, 1 thoracic vertebra fragment, 1 lumbar vertebra fragment, 7 rib fragments, 1 humerus fragment, 6 radius fragments, 2 ulna fragments, 1 carpal, 3 innominate fragments, 5 femur fragments, 1 tibia fragment, 7 astragalus fragments, 1 tarsal, 2 metatarsal fragments, 1 metapodial fragment, 5 phalanx fragments, 7 sesamoids.
Zone 3: 3 skull fragments, 3 mandible fragments, 1 hyoid fragment, 1 atlas vertebra fragment, 1 axis vertebra fragment, 10 cervical vertebra fragments, 3 thoracic vertebra fragments, 5 lumbar vertebrae, 20 lumbar vertebra fragments, 18 vertebra fragments, 18 rib fragments, 4 scapula fragments, 12 humerus fragments, 10 radius fragments, 4 ulna fragments, 2 carpal fragments, 4 metacarpal fragments, 5 innominate fragments, 8 femur fragments, 13 tibia fragments, 11 astragalus fragments, 2 calcaneus fragments, 1 tarsal, 2 tarsal fragments, 9 metatarsal fragments, 9 metapodial fragments, 6 phalanx fragments, 12 sesamoids.
Zone 4: 1 lumbar vertebra fragment, 2 rib fragments, 1 innominate fragment, 1 metapodial fragment.

Elk-Sized

Zone 1: 1 lumbar vertebra fragment.
Zone 2: 1 skull fragment, 1 vertebra fragment, 1 rib fragment, 1 femur fragment, 1 phalanx fragment.
Zone 3: 3 first phalanx fragments, 1 radius fragment, 1 molar fragment, 3 sesamoids.
Zone 4: 1 radius fragment.

Family Chelydridae

Chrysemys picta

Zone 1: 3 humerus fragments, 43 shell fragments.
Zone 2: 1 innominate fragment, 3 humerus fragments, 153 shell fragments.
Zone 3: 1 humerus fragment, 11 shell fragments.
Zone 4: 9 shell fragments.

Family Viperidae

Zone 1: 1 vertebra fragment.

Family Ranidae/Bufonidae

Zone 1: 1 radio ulna, 2 complete skeletons.
Zone 2: 2 innominates, 4 radio ulnas.

Family Salmonidae

Zone 1: 4 vertebrae, 3 vertebra fragments.
Zone 2: 30 vertebrae, 10 vertebra fragments.
Zone 3: 187 vertebrae, 2 vertebra fragments.
Zone 4: 5 vertebrae.

Family Cyprinidae

Zone 1: 3 vertebrae.
Zone 2: 23 vertebrae, 3 vertebra fragments.
Zone 3: 6 vertebrae, 3 vertebra fragments.

APPENDIX D:

FEATURE 5 BOTANICAL ASSEMBLAGE, 45-DO-214

50N26E Feature 5, UL 100 and 110. Weight:26.62 g.

DEPTH	MASTER #	DESCRIPTION
94 b.u.d.	1494	Birch bark wrapped Douglas fir tool. The birch bark construction is 2.9 cm wide, 1.5 cm thick, with a surviving length of 4 cm. Both ends are missing. A resinous or pitch-like substance coats a portion of the surface. The bark strips range from 3.2 to 6.7 mm wide and about 350 micrometers thick. They are incompletely carbonized. At least 16 layers of bark can be seen from wood to the surface. These may be cemented together although this is difficult to tell since preservative was applied in the field. Total weight with wood, 4.23 g (see also constructions M1505 and 1518). Five loose birch bark strips were found with the above, weight 0.25 g. A piece of Douglas fir wood was removed from the construction. It is 5 mm wide, 1.2 mm thick with a surviving length of 1.1 cm and weight of 0.03 g. The wood appears charred; one end appears to have a single bevel. The wood has three annual rings showing early wood collapse. Three other Douglas fir fragments with a total weight of 0.16 g were found with the above items. The pieces belong together although they do not fit perfectly. One piece shows signs of surface cutting; and two pieces show stress marks across their flat side. Eleven annual rings were counted, and the three pieces together are 1 cm wide by 4 mm thick, and 2.5 cm long. The likely shape of the fir object inside the wrapping is a flat piece 2.5 mm wide by at least 5 mm wide. The sides may have been thinned.

DEPTH	MASTER #	DESCRIPTION
98 b.u.d.	1493	Birch bark wrapping, portion of a construction consisting of four layers of loose plaiting with bark widths of 5.9 to 6.6 mm. Two of the fragments have two and three strips adhering. Also 39 cut and torn strips were found in the sample with widths from 4.2 to 12.0 mm wide. Total weight, 1.74 g. One bark strip found with cork adhering, 0.02 g. One bark strip with pitch on the outer or dorsal surface and a single fine fiber strand believed to be hemp fiber glued to the ventral surface, 0.01 g. Three small fragments of charred Douglas fir wood weighing 0.02 g were found loose among the bark. Note: some of the bark strips have pitch on their surfaces; some are curled from side to side indicating heat, a few are not carbonized, but most are incompletely carbonized.
98 b.u.d.	1518	Birch bark wrapped Ponderosa pine tool. The birch bark construction is 2.5 cm wide, 1.5 cm thick with a surviving length of 6.2 cm. Both ends are missing. The wrappings consist of seven layers of bark running parallel to the long axis of the wood in the interior. Outer layers lie at various angles to the long axis. Some of the strips do not appear carbonized, and portions of the wrapping have a resinous or pitch-like substance adhering. The wood inside the wrapping is a flat piece at least 19 mm wide and 3 mm thick with a surviving length of 6.2 cm. The top edge of the wood appears flattened or mostly squared, while the bottom has a double bevel or knifelike edge. Four annual rings can be seen and the early wood is collapsed, thus the width of the piece was probably greater than 5 mm. Note that item 1495 discussed above also has wood showing signs of stress or decay. See also item M1505. Total weight with modern preservative, 3.75 g.
98 b.u.d.	1610	Cut and smoothed charred oceanspray wood. Cross section is trapezoidal; it is at least 1.5 cm wide and 0.8 cm thick, with a surviving length of 1 cm. Five to seven annual rings are present and smoothing is evident over two contiguous sides. The object has been made by splitting a cane or branch down the middle, removing the pith and shaping. Total weight, 2.9 g. Note: this was formerly a radiocarbon sample, RS33.

DEPTH	MASTER #	DESCRIPTION
98 b.u.d.	1520	Mixed material, total weight of botanicals, 0.59 g. Birchbark strips not completely carbonized with widths to 7.5 mm, weight 0.73 g. No preservatives used. Carbonized Douglas fir wood, -0.01 g. Apocynum fibers embedded in resinous or pitchlike substance on birch bark. Fibers are incompletely retted and well retted stages of manufacture. See also M1504. Weight 0.21 g with pitch and bark. Resin or pitch particles deformed by heat, 0.01 g. Non-botanical materials include: blackened bone (0.02 g), blackened cryptocrystalline stone (0.23 g), and fragments of unidentified organic material, possibly faunal in origin (0.03 g) (see also M1602, 1605 and 1607).
98 b.u.d.	1566	Small fragment of birch bark wrapping. Six layers of bark stuck together, 0.02 g. Untreated. The strips vary from 4.2 to 8.0 mm in width. Some are carbonized but most are incompletely carbonized. A small amount of pine charcoal, 0.02 g, was found with the bark, but not stuck to it. The pine species cannot be identified because the wood seems to be from knot material.
100 b.u.d.	1505	Birch bark wrapped construction. Terminal portion with pointed end. The interior is partially filled with sand and small fragments of charred wood. The wood is probably pine. The wrapping is 2.5 cm wide and 1.2 cm thick with a surviving length of 6.3 cm. The long axis has a slight bow or curve. The strips vary in width from 4.1 to 8.2 mm. Some are not carbonized. The object inside, as revealed by the negative mould of the wrappings, was at least 1.8 cm wide tapering to a prowlike point 3 mm wide. The bottom edge appears to have had a double bevel or a knifelike edge. The top edge appears squared off. In size, strip attributes, width and edge configuration, the object appears to resemble item M1518. Both would encompass an object at least 13 cm long and the wood inside would resemble a thin lathlike piece with a knifelike point. The objects have been somewhat damaged.

DEPTH	MASTER #	DESCRIPTION
UL 100	1504	Birch bark wrapped Douglas fir tool, terminal portion. The wrapping is 2.5 cm wide and 1.1 cm wide with a surviving length of 6.8 cm. One edge is straight while the other edge is convex. Terminal width at the butt end, 2.4 cm. The wood inside the wrapping is incompletely charred slow growth bole wood with at least 20 annual rings showing. The piece, split from radially cut wood, is at least 1.8 cm wide and 3.5 mm thick in the middle, tapering to 2.5 mm at the edges. Both edges appear gently rounded. The object is from a cut different from that of fir wrapped item M1495, thus the two cannot be joined. Also, the birch bark strips are of slightly finer manufacture and most pieces are about 3 to 4 mm wide. A section of the wrapping has Apocynum fibers embedded in a pitch-like substance stuck to the outside. Some of the material from item M1520 may mate with these. Total weight, including modern preservative, 6.09 g.
UL 100	1516	Thirty-three mostly loose birch bark strips: three groups of three adherent strips; two groups of two adherent strips; and one pitch or resin-surfaced strip. The remainder are single, more or less flat, pieces that vary in width from 2.0 to 6.8 mm. Some are not carbonized. Total weight without modern preservative, 1.71 g.
101 b.u.d.	1601	Bark haft wrapping with pigment traces. Approximately one half of the object survives and consists of 13 finely wrapped layers of bark material (genus unknown) with a width of 8.5 mm in diameter and a surviving and possibly total length of 16 mm. Total weight without modern preservative is 0.12 g. The bark is not carbonized and traces of a bright red pigment are found on the surface.
105 b.u.d.	1575	Birch bark strips, 0.08 g. Two long fragments and several partial fragments. The two that can be measured are 5.8 and 6.0 mm wide. All are incompletely carbonized. These were taken from a soil sample given field number 29, and were untreated with preservatives.

DEPTH	MASTER #	DESCRIPTION
110 UL	1576	Ten small pieces of processed birch bark, 0.04 g, incompletely carbonized. Removed from soil sample with a field number 68. Untreated.

50N26E, NW Quad, UL 100, 110 and 120. Weight: 1.71 g.

DEPTH	MASTER #	DESCRIPTION
100 UL	1433	Birch bark wrapping, portion of a construction for an item about 13 mm in one dimension (width or thickness, but not length). At least 14 layers total, with eight of these laid parallel to the long axis of the object. Untreated by modern preservatives, but securely glued in place. Loose material present including a portion of a half hitch knot. All material is carbonized, total weight 1.11 g.
100 UL	1603	Birch bark wrapping, portion of a construction, small fragment consisting only of five layers laid parallel. Incompletely carbonized, total weight 1.11 g.
110 UL	1602	Incompletely carbonized woods consisting of 0.17 g of western white pine, 0.04 g of Douglas fir, a trace of yew and a trace of hawthorn. Other material present includes 0.95 g of organic material not thought to be floral in nature, and 0.45 g fish bone and vertebral element.
120 UL	1441	Two birch bark strip fragments, carbonized, with a weight of 0.01 g.

50N26E, SW Quad UL 90, 100 and 110. Weight 8.02 g.

DEPTH	MASTER #	DESCRIPTION
90 UL	1482	Trace of ponderosa pine and a trace of other conifer charcoal.
90 UL	1606	Chokecherry (Prunus) pit with embryo and flesh adhering, charred and nearly complete, 0.04 g.

DEPTH	MASTER #	DESCRIPTION
109 b.u.d.	RS36	Residue coated sand. Quartzite grains with thin covering of organic material. The material is darkly translucent and each grain seems uniformly covered. The sand grains adhere slightly to one another. Uncharred birch bark present, at 0.04 g; wood (conifer) charcoal present as specks.
100 b.u.d.	1461	Charred spruce wood, 0.01 g.
100 UL	1485	Pine cone fragments, charred 0.02 g.
100 UL	1607	Mixed material including chokecherry pit fragments representing one charred fruit with partial flesh at 0.03 g, and giant ryegrass (Elymus) covered with organic residue not believed to be floral in nature at 0.01 g. The grass is incompletely charred. Incompletely charred woods present include 3.78 g yew, 1.93 g yellow cedar, 1.69 g spruce, 0.64 g red cedar, and 0.04 g maple. Other material from the sample includes fragments of bone and lithic materials covered in organic residue.

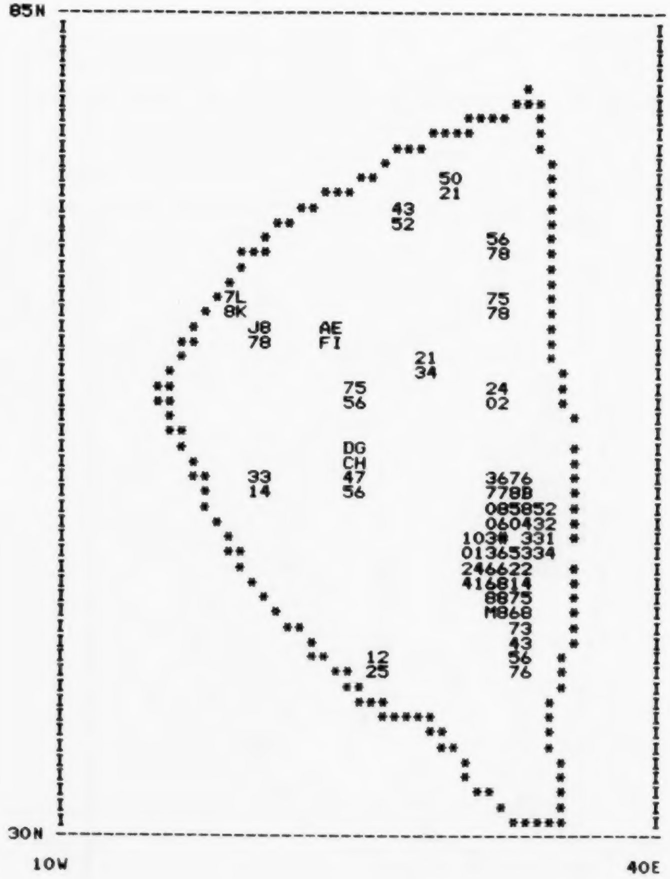
50N26E, SE Quad, UL 80, 90, and 110. Weight 4.78 g.

DEPTH	MASTER #	DESCRIPTION
80 UL	1604	Red cedar tool. The object is uncharred, and flat and spatulate in outline. It varies in width from 2.1 to 1.6 cm, and has a thickness of from 0.6 to 0.7 cm. The surviving length is 12.8 cm, but as both ends are damaged it may have been longer. Up to seven annual rings can be seen. The wood is from a tangentially split piece. Insect and root remains can be seen inside cell cavities. In fair to poor condition, the wood was not treated with preservative, and weighs 3.56 g.

DEPTH	MASTER #	DESCRIPTION
90 UL	1605	Mixed material. Burned and unburned occupational debris consisting of wood, birch bark, and bone. The wood consists of 0.46 g of red cedar, 0.15 g of ponderosa pine, 0.05 g of yew, 0.07 g of bitterbrush (this is completely carbonized, the other woods are not), and 0.01 g of birch bark with adherent organic residue.
110 UL	1609	Incompletely charred wood consisting of 0.05 g pine, 0.12 g red cedar, 0.02 g of yellow cedar, 0.19 g of Douglas fir, and 0.10 g of yew branch wood.

APPENDIX E:

ARTIFACT DISTRIBUTIONS, 45-DO-214



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	2
2	3	5
3	6	8
4	9	12
5	13	20
6	22	30
7	31	53
8	55	79
9	91	248
#	no data	

INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	248	H	134
B	238	I	117
C	219	J	102
D	188	K	102
E	180	L	93
F	180	M	91
G	171		

STATISTICS

Mean	36.5	Sum	4,304
s.d.	50.9	SS	462,434
Count	118	Var	2,588.5

Figure E-1. Bone count distribution for Zone 4, 45-DO-214.

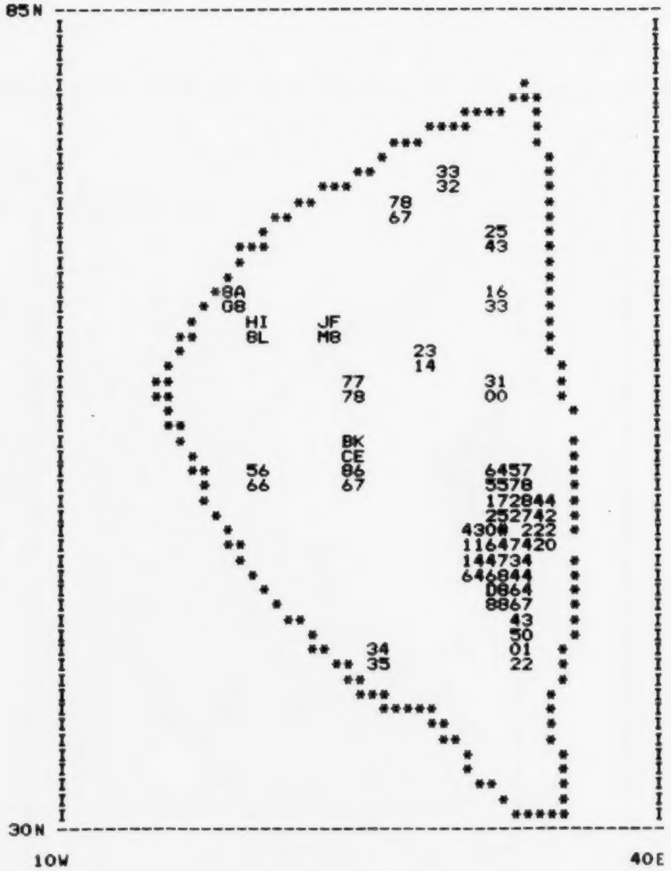


Figure E-2. Lithic count distribution for Zone 4, 45-DO-214.

KEY

FREQUENCY INTERVALS

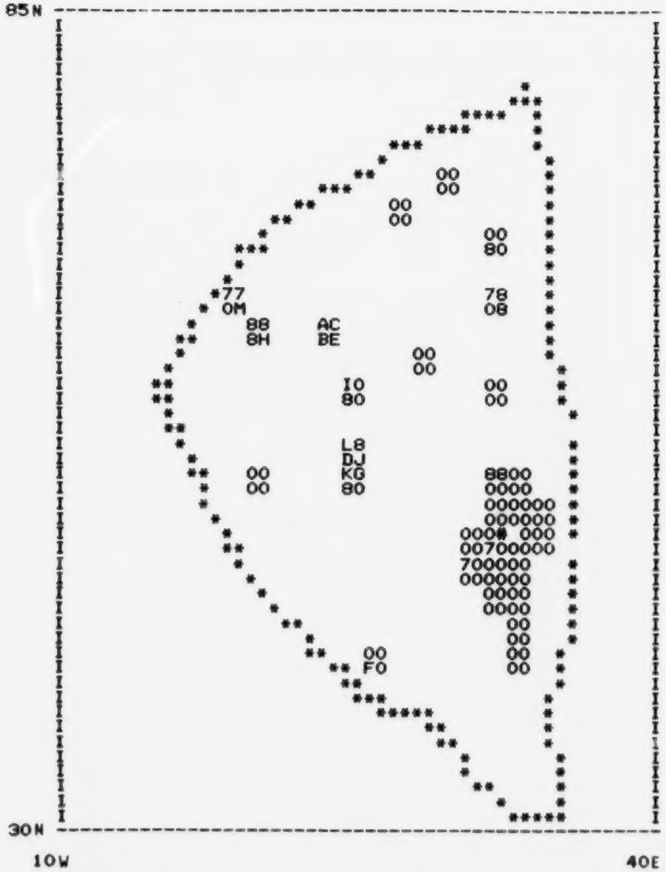
Interval	Minimum Value	Maximum Value
1	0	1
2	2	3
3	4	5
4	6	7
5	8	10
6	11	16
7	18	25
8	27	43
9	45	77
#	no data	

INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	77	H	54
B	69	I	52
C	67	J	50
D	67	K	48
E	61	L	45
F	60	M	45
G	58		

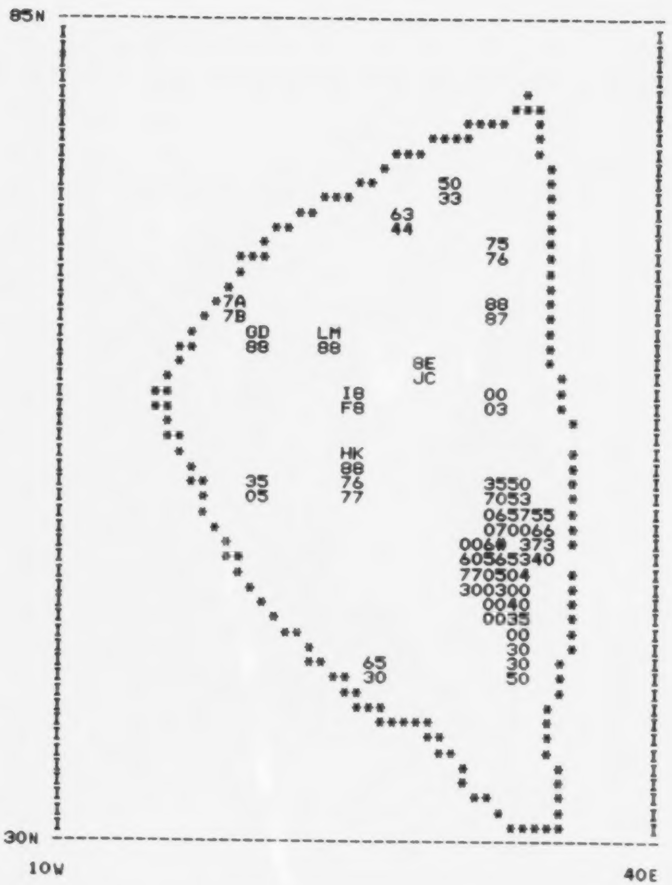
STATISTICS

Mean	16.4	Sum	1,936
s.d.	18.2	SS	71,044
Count	118	Var	332.9


85N
30N
10W
40E
*77
OM
88
8H
AC
BE
IO
80
L8
DJ
KG
80
78
08
FO

```
                     KEY

            FREQUENCY INTERVALS

                Minimum       Maximum
 Interval        Value         Value

    1              0             0
    2            -99           -99
    3            -99           -99
    4            -99           -99
    5            -99           -99
    6            -99           -99
    7              1             1
    8              2             4
    9              5            61
    #           no data

          INTERVAL 9 SUBDIVISIONS

 Division  Value     Division  Value

    A        61         H        10
    B        50         I        10
    C        23         J        10
    D        16         K        10
    E        12         L         9
    F        12         M         5
    G        11

                STATISTICS

 Mean       2.3       Sum       276
 s.d.       7.9       SS      8,028
 Count      118       Var      62.6
```

Figure E-3. FMR count distribution for Zone 4, 45-DO-214.


85N
30N
10W
40E
50
33
63
44
75
76
*7A
7B
GD
88
LM
88
88
87
8E
JC
I8
F8
00
03
HK
88
76
77
35
05
3550
7053
065755
070066
006# 373
60565340
770504
300300
0040
0035
00
30
65
30
30
50

KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	1	1
4	2	2
5	3	4
6	5	7
7	8	22
8	23	157
9	184	1,471
#	no data	

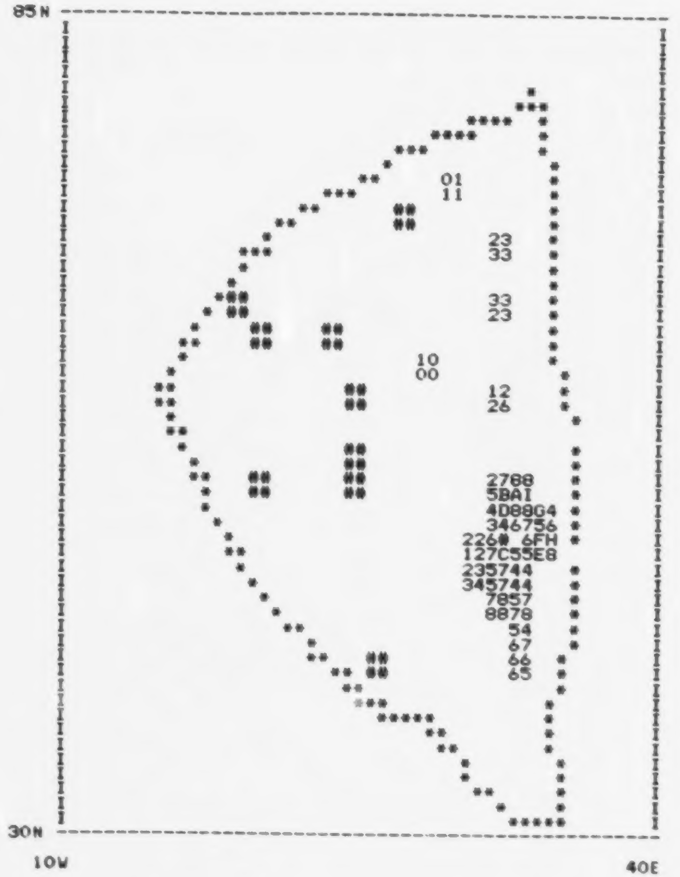
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	1,471	H	270
B	729	I	288
C	639	J	266
D	470	K	253
E	332	L	189
F	310	M	184
G	271		

STATISTICS

Mean	61.0	Sum	7,193
s.d.	176.0	SS	4,094,779
Count	118	Var	30,985.7

Figure E-4. Shell count distribution for Zone 4, 45-DO-214.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	6
2	7	24
3	28	65
4	78	175
5	187	245
6	247	296
7	307	353
8	374	567
9	671	2,980
#	no data	

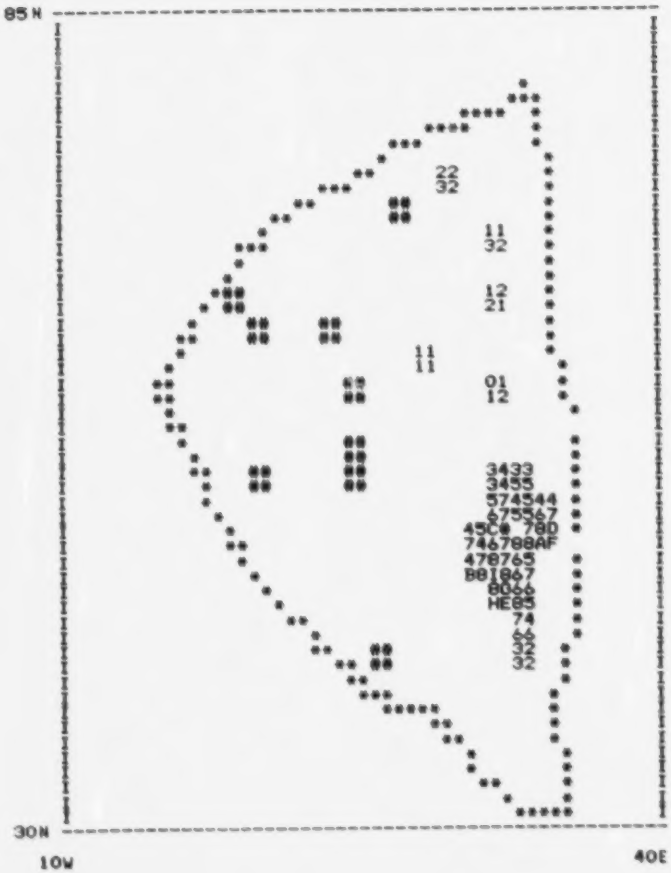
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	2,980	F	832
B	1,269	G	812
C	1,223	H	727
D	1,127	I	671
E	841		

STATISTICS

Mean	286.2	Sum	23,468
s.d.	407.9	SS	20,360,586
Count	118	Var	166,382.2

Figure E-5. Bone count distribution for Zone 3, 45-DO-214.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	6
2	7	16
3	17	27
4	29	39
5	42	55
6	60	75
7	78	98
8	104	126
9	133	174
#	no data	

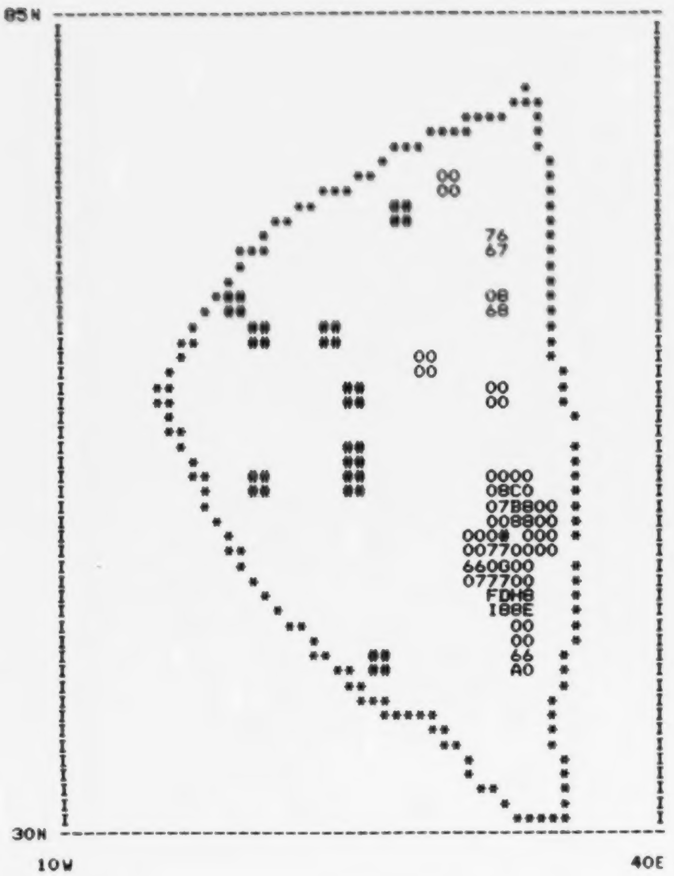
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	174	F	143
B	158	G	136
C	148	H	135
D	146	I	133
E	144		

STATISTICS

Mean	59.1	Sum	4,846
s.d.	46.4	SS	462,616
Count	82	Var	2,148.1

Figure E-6. Lithic count distribution for Zone 3, 45-DO-214.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	-99	-99
4	-99	-99
5	-99	-99
6	1	1
7	2	3
8	4	7
9	8	319
#	no data	

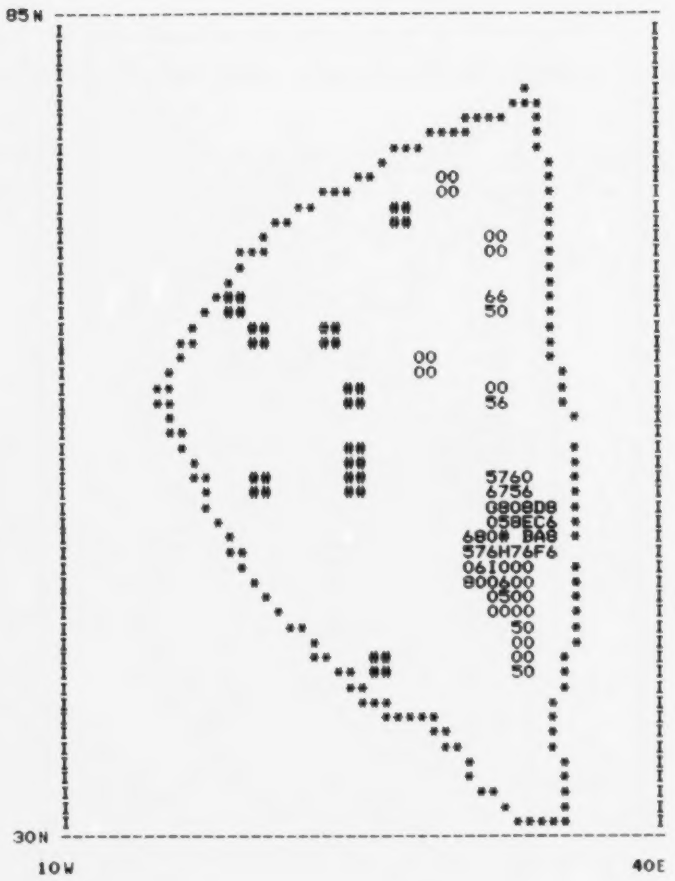
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	319	F	11
B	68	G	9
C	19	H	9
D	19	I	8
E	15		

STATISTICS

Mean	6.8	Sum	556
s.d.	35.7	SS	108,044
Count	82	Var	1,271.6

Figure E-7. FMR count distribution for Zone 3, 45-DO-214.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	-99	-99
4	-99	-99
5	1	1
6	2	3
7	4	4
8	5	8
9	9	23
#	no data	

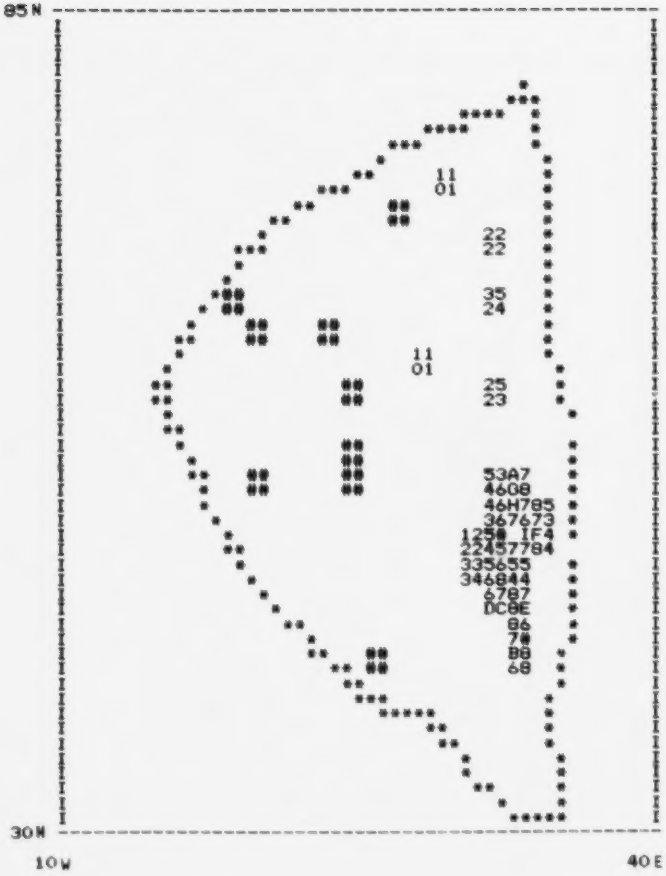
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	23	F	11
B	15	G	10
C	12	H	9
D	11	I	9
E	11		

STATISTICS

Mean	2.6	Sum	215
s.d.	4.2	SS	1,987
Count	82	Var	17.4

Figure E-8. Shell count distribution for Zone 3, 45-DO-214.


85N
30N
10W
40E
11
01
22
22
35
24
11
01
25
23
53A7
4608
46H785
367673
1250 IF4
224577784
335655
346844
6787
DC8E
86
70
B8
68

KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	7
2	10	44
3	50	69
4	73	124
5	134	193
6	206	355
7	370	431
8	437	605
9	650	1,292
#	no data	

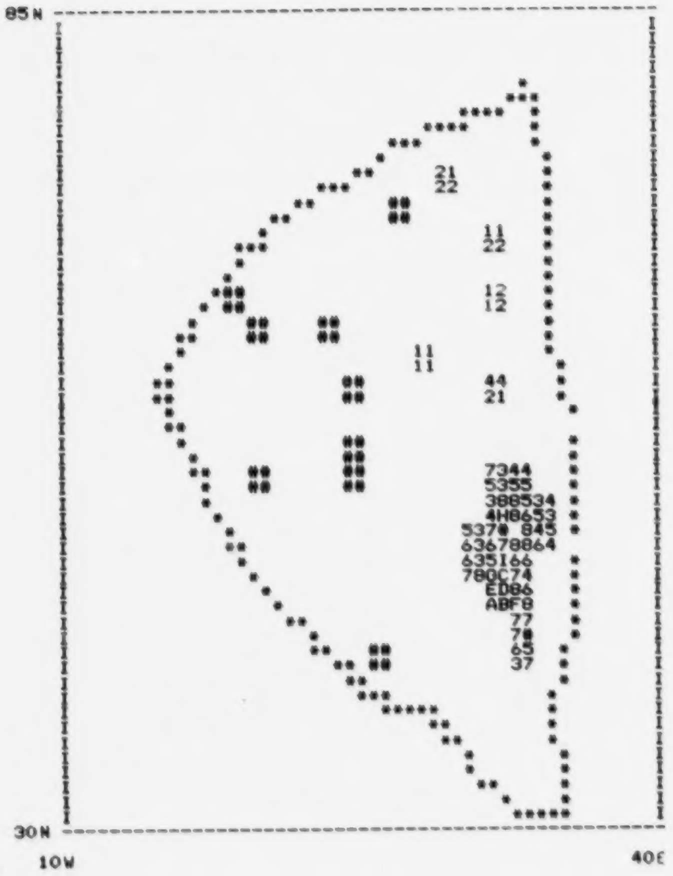
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	1,292	F	673
B	906	G	662
C	825	H	662
D	821	I	650
E	15		

STATISTICS

Mean	256.5	Sum	20,776
s.d.	260.8	SS	10,840,190
Count	81	Var	68,040.4

Figure E-9. Bone count distribution for Zone 2, 45-DO-214.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	1	7
2	8	14
3	15	24
4	25	33
5	34	41
6	42	61
7	63	76
8	88	131
9	144	263
#	no data	

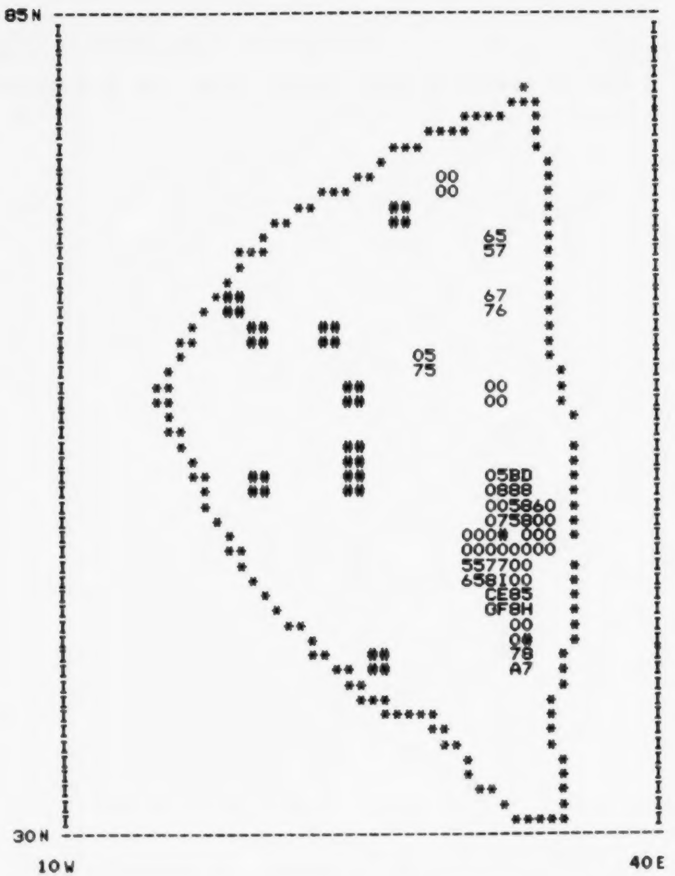
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	263	F	228
B	258	G	165
C	252	H	149
D	242	I	144
E	230		

STATISTICS

Mean	59.8	Sum	4,841
s.d.	63.9	SS	619,787
Count	81	Var	4,079.8

Figure E-10. Lithic count distribution for Zone 2, 45-DO-214.


85N
30N
10W
40E
00
00
65
57
67
76
05
75
00
00
05BD
0888
005860
075800
000# 000
00000000
557700
658I00
CE85
GF8H
00
0#
78
A7

KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	-99	-99
4	-99	-99
5	1	2
6	3	4
7	5	15
8	16	51
9	54	283
#	no data	

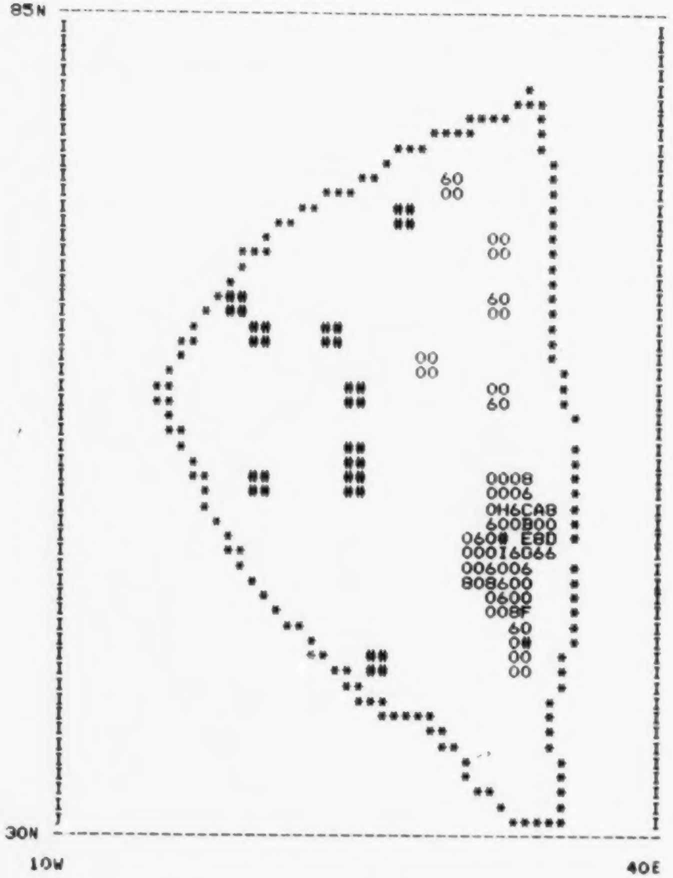
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	283	F	75
B	180	G	60
C	115	H	57
D	95	I	54
E	89		

STATISTICS

Mean	16.5	Sum	1,337
s.d.	42.5	SS	168,565
Count	81	Var	1,808.6

Figure E-11. FMR count distribution for Zone 2, 45-DO-214.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	-99	-99
4	-99	-99
5	-99	-992
6	1	1
7	-99	-99
8	2	3
9	4	19
#	no data	

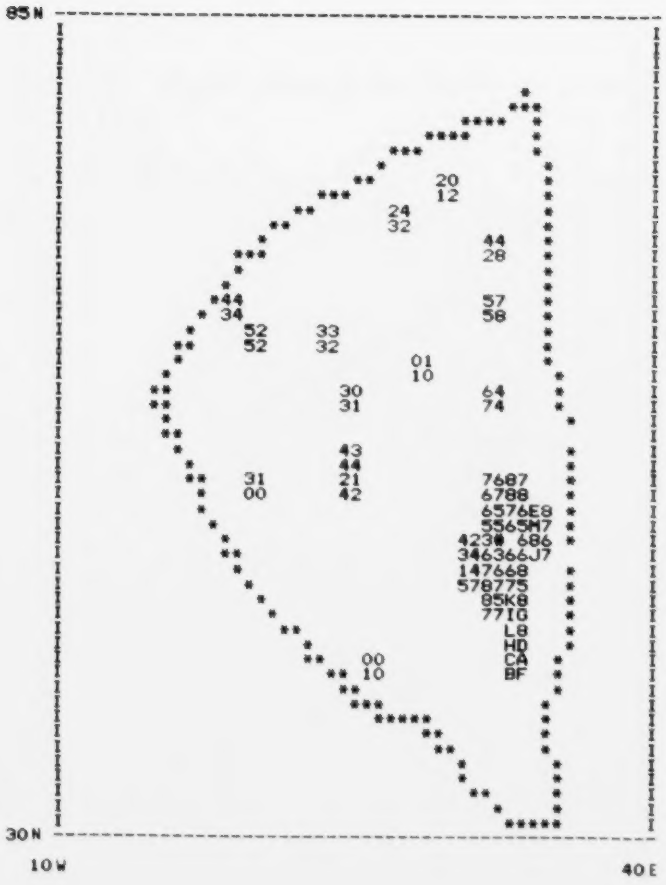
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	19	F	6
B	19	G	5
C	11	H	4
D	10	I	4
E	7		

STATISTICS

Mean	1.4	Sum	114
s.d.	3.5	SS	1,134
Count	81	Var	12.0

Figure E-12. Shell count distribution for Zone 2, 45-DO-214.


85N
30N
10W
40E
20
12
24
32
44
28
44
34
57
58
52
52
33
32
01
10
30
31
64
74
43
44
31
21
00
42
7687
6788
6576E8
5565M7
423# 686
346366J7
147668
578775
85K8
77IG
L8
HD
00
CA
10
BF

KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	1
2	2	4
3	5	8
4	9	18
5	19	27
6	28	45
7	47	72
8	77	172
9	185	557
#	no data	

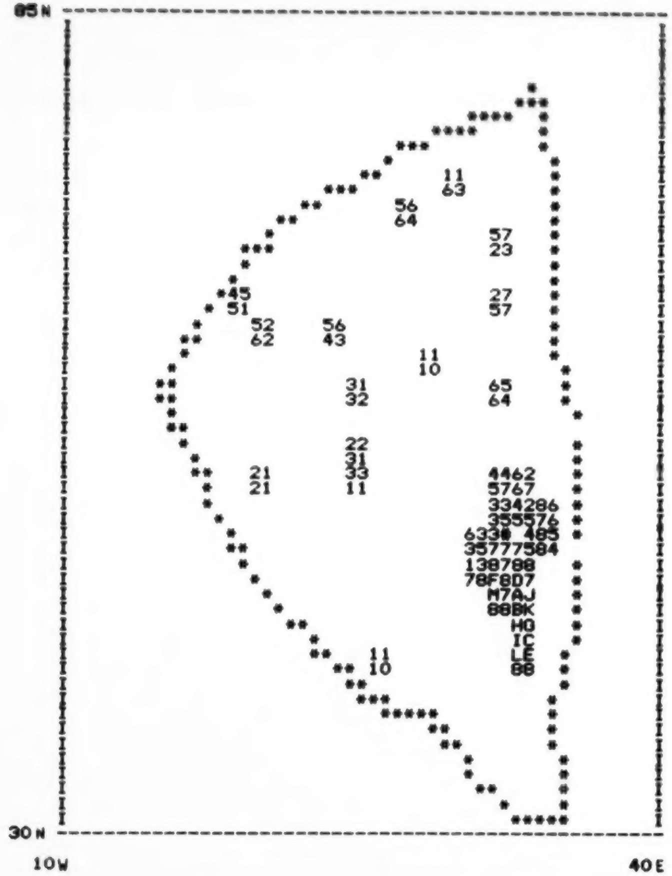
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	557	H	252
B	546	I	244
C	419	J	234
D	386	K	230
E	342	L	220
F	323	M	185
G	274		

STATISTICS

Mean	63.0	Sum	7,433
s.d.	105.9	SS	1,790,589
Count	118	Var	11,208.4

Figure E-13. Bone count distribution for Zone 1, 45-DO-214.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	4
2	5	6
3	7	9
4	10	11
5	12	15
6	16	19
7	20	30
8	31	55
9	55	117
#	no data	

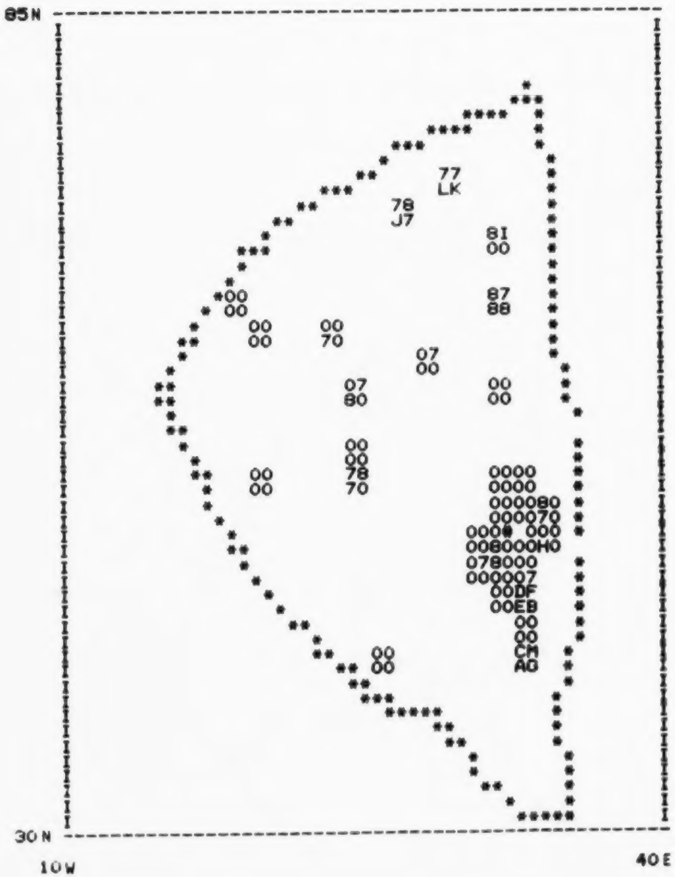
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	117	H	64
B	113	I	60
C	101	J	59
D	75	K	57
E	70	L	56
F	68	M	55
G	66		

STATISTICS

Mean	21.3	Sum	2,516
s.d.	23.0	SS	115,918
Count	118	Var	527.7

Figure E-14. Lithic count distribution for Zone 1, 45-DO-214.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	-99	-99
4	-99	-99
5	-99	-99
6	-99	-99
7	1	1
8	2	5
9	7	67
#	no data	

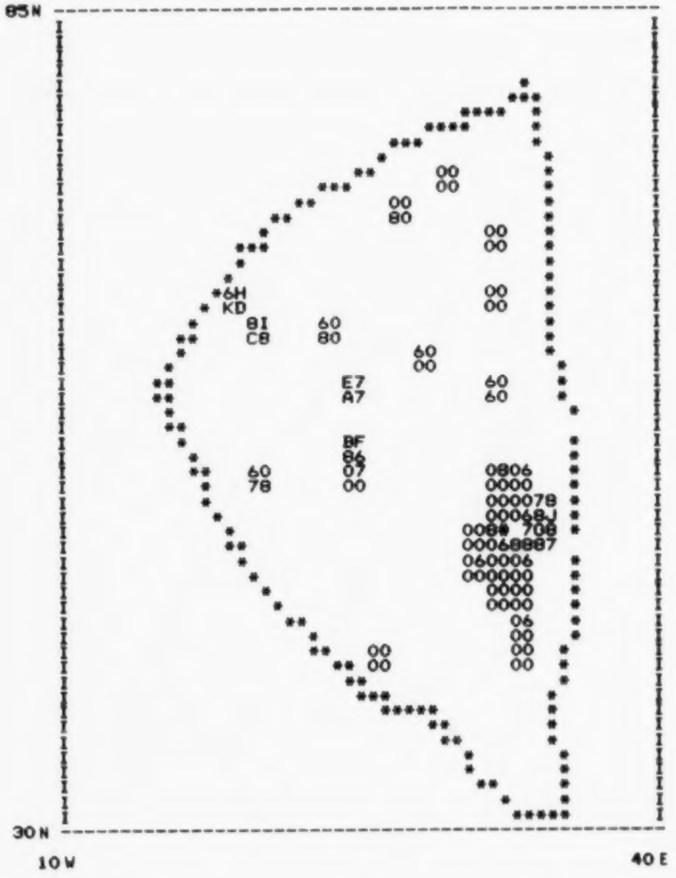
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	67	H	19
B	39	I	18
C	31	J	11
D	25	K	10
E	23	L	8
F	22	M	7
G	21		

STATISTICS

Mean	2.9	Sum	341
s.d.	8.8	SS	10,163
Count	119	Var	77.8

Figure E-15. FMR count distribution for Zone 1, 45-DO-214.



```
                         KEY

                FREQUENCY INTERVALS

                  Minimum      Maximum
Interval           Value        Value

    1                 0            0
    2               -99          -99
    3               -99          -99
    4               -99          -99
    5               -99          -99
    6                 1            1
    7                 2            2
    8                 3            5
    9                 6           29
    #              no data

             INTERVAL 9 SUBDIVISIONS

Division  Value     Division  Value

   A        29         G         8
   B        24         H         7
   C        17         I         7
   D        15         J         7
   E        13         K         6
   F        12

                   STATISTICS

Mean      1.9       Sum      226
s.d.      4.4       SS     2,750
Count     118       Var     19.6
```

Figure E-16. Shell count distribution for Zone 1, 45-DO-214.

APPENDIX F:

DESCRIPTION OF CONTENTS OF UNCIRCULATED APPENDICES

Detailed data from two different analyses are available in the form of hard copies of computer files with accompanying coding keys.

Functional analysis data include provenience (site, analytic zone, excavation unit and level, and feature number and level (if applicable); object master number; abbreviated functional object type; and coding that describes each tool on a given object. Data normally are displayed in alphanumeric order by site, analytic zone, functional object type, and master number. Different formats nay be available upon request depending upon research focus.

Faunal analysis data include provenience (site, analytic zone, excavation unit and level, feature number, and level (if applicable); taxonomy (family, genus, species); skeletal element; portion; side; sex; burning/butchering code; quantity; and age. Data normally are displayed in alphanumeric order by site, analytic zone, provenience, taxonomy, etc.

To obtain copies of the uncirculated appendices contact U.S. Army Corps of Engineers, Seattle District, Post Office Box C-3755, Seattle, Washington, 98124. Copies also are being sent to regional archives and libraries.